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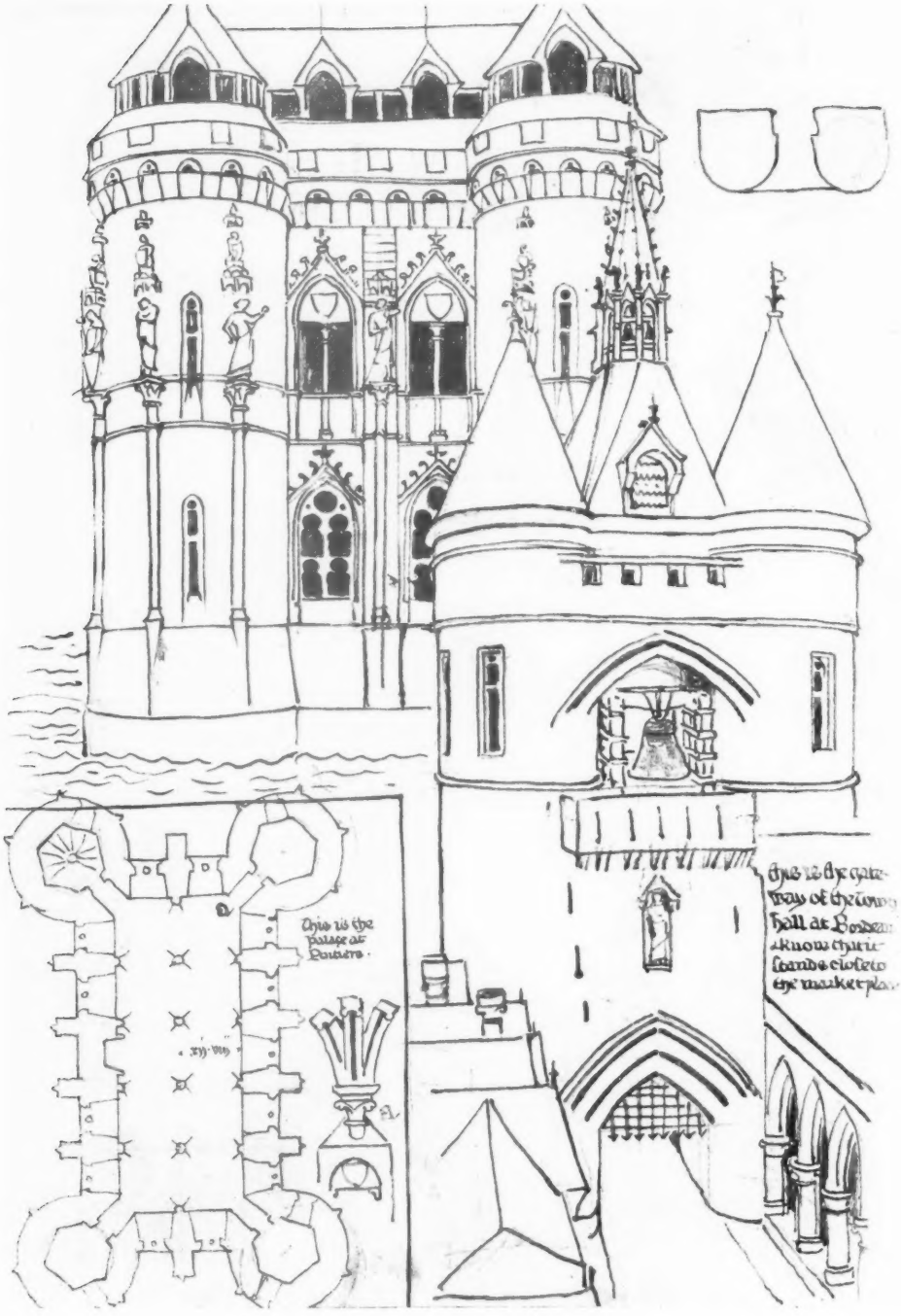

From Wm. Burges' Sketch-Book (1828-81):
The Palace at Poitiers
The Gateway of the Town Hall at Bordeaux

R.I.B.A. Collection

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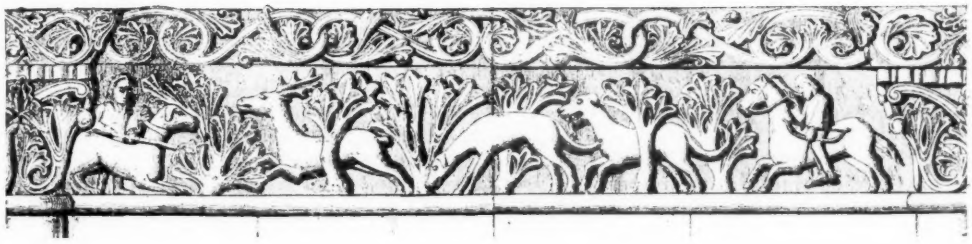


Stone Preservation and Decay

BY PROFESSOR A. P. LAURIE, M.A., D.Sc., F.R.S.E., F.C.S. [*H.A.*]

[*A Paper read before the Royal Institute of British Architects on Monday, 20 February* 1928]

THE whole question of stone preservation and decay is a very complex one, involving many complicated physical and chemical changes, and, moreover, it is a specially difficult matter of research because we are dealing with the slow actions taking place over a considerable period of time, and it is difficult in laboratory experiments to obtain conditions which can be regarded as reliable when the time factor enters in. Chemical changes which are so minute as to escape laboratory investigation may become very important when the time factor comes in. Moreover, the final test must be one of what actually happens in practice, and here again some considerable time must elapse before conclusions could be drawn. There is no question, therefore, that the architects could not ask of men of science a more difficult piece of research.

I wish to-night to bring before you a few of the results of such research ; and if you feel at the end that many of the more important questions still remain to be answered, I can only say that you must have patience with the investigators. It is only in recent years that the matter has been taken up by the Department of Scientific and Industrial Research, who have appointed a special committee to deal with the question, among the other scientific questions involved in the business of building, and have appointed a most capable investigator of building research—Dr. Stradling—who, with a well-equipped laboratory and a brilliant staff of assistants, is taking up this question of stone decay among other problems.

In considering the various causes of stone decay, it is necessary in the first instance to take into consideration those causes which may be regarded as mechanical. There is, in the first place, the effect of changes of temperature, causing expansion and contraction, an effect which is most marked on stones of complex composition, such as granites, which consist of a mass of interlocking crystals of different minerals, each with its own coefficient of expansion with change of temperature. There is also the mechanical effect of wetting and drying. Some stones expand much more when wetted than others, thus setting up stresses in the mass of the stone which may cause fractures. There is the fact of wind blowing gritty particles against the particles of the stone and rubbing it away. A very remarkable result of the destruction produced by sand particles blown by wind is to be found in rocks in desert regions. The cloisters of Durham Cathedral are another very interesting example. These cloisters are very windy, and the gritty sandstone of which the cloisters are built having once been partially powdered away, the wind has blown the stone dust round and round these cloisters and has drilled holes in the surface of the stone very much resembling the appearance of the bottom of a river stream where holes have been drilled by the action of pebbles rolling with the flow of water. Each of these hollows is full

of gritty sand ready for the next wind storm to continue its drilling operations. Then there is the freezing of water in the pores of the stone, the well-known expansion which takes place when water has passed into ice, breaking up the stone. The practical effect is much less than would be expected, and is probably due to the fact that, the fall of surface temperature being greater than the fall of temperature within the stone, there is a rise of surface tension which draws water out of the pores, so that the pores are not loaded with water when the freezing takes place.

There is also the slow chemical action due to the solvent properties of water itself, and also due to the solvent properties of water containing carbonic acid gas in solution. The various varieties of carbonate of lime, limestone, marble and the calcite crystals contained in many sandstones are all soluble in water containing an excess of carbonic acid gas, and the beautiful stalactites and stalagmites seen in caves and limestone rocks are due to the dropping through the roof of water containing carbonate of lime in solution and depositing it when the drops are exposed to the air. In addition to this natural chemical action it has been shown by recent experiments that there is a bacterial attack upon stones, certain bacteria producing acids which act upon the stone surface. These may be ali regarded as natural causes of decay, but under the conditions existing in our modern cities where large quantities of coal are burnt containing a considerable percentage of sulphur, the burning of the sulphur results in the production of a gas known to chemists as sulphur dioxide, and this gas in the presence of air and moisture is converted into sulphuric acid. This sulphuric acid, when brought into contact with any variety of carbonate of lime, attacks the carbonate of lime, converting it into sulphate of lime, a material with which the architects are familiar in the form of gypsum or plaster of Paris.

Of all methods of decay there can be no question that the most active at the present day is this attack of the sulphur acids. If the effect were one merely of solution of the stone, sulphate of lime being slightly soluble in water, the decay would not proceed very fast even in our modern cities; but, unfortunately, what happens is that the sulphate of lime, slightly soluble in water, tends to be deposited in crystals within the surface of the stone, and that the growth of these crystals ultimately shatters the stone surface. The distribution of this mischief is much wider than would have been supposed possible. It is evident that under certain conditions the air containing these sulphur acids is carried over a considerable distance, remote buildings being attacked. To take two examples, Rievaulx Abbey, lying in a wooded vale in Yorkshire far from industrial centres, which was found, on analyses of the crumbling stone, to contain a considerable percentage of sulphate of lime; and Ely Cathedral, which is in the Fens, and far away from any great centre of population, contains on the outer walls a curious grey deposit which on analysis proves to contain some 21 per cent. of sulphate of lime. It is evident, then, that the distribution of the decay from the sulphur acids is widespread to-day.

In addition, the interiors of some of our cathedrals have suffered from the careless arrangements made for heating, by which sulphur fumes have escaped into the building, and probably in the old days from the use of the impure coal gas of the past. To take two examples, the following are the analyses of a boring made into the oolitic limestone of which Lincoln Cathedral is built. It will be seen that there is a high percentage of sulphate of lime and it has penetrated to a considerable depth. If this is compared with the analysis of the stone outside, it will be noted that the percentage of sulphate of lime is a good deal lower. This, however, may be due to the washing out of part of the sulphate of lime by the rain, and in the case of Lincoln Cathedral, which is in the centre of an industrial town, it cannot be assumed that all the sulphate of lime in the interior is due to the methods of heating and lighting, but in the case of Ely Cathedral the limestone of which the interior carvings are made is covered with a white powder which on analysis gave the following result—namely, 31 per cent. of sulphate of lime.

TABLE OF BORINGS INSIDE AND OUTSIDE LINCOLN CATHEDRAL.

INSIDE.

	0″–$\frac{1}{4}$″	$\frac{1}{4}$″–$\frac{1}{2}$″	$\frac{1}{2}$″–$\frac{3}{4}$″	$\frac{3}{4}$″–1″
Moisture	1·30	1·30	1·50	1·10
Insoluble in hydrochloric acid	2·90	2·70	3·00	2·80
Oxides of iron and alumina	7·30	8·60	4·90	5·40
Calcium oxide (CaO)	46·54	46·05	49·67	49·67
Carbonic anhydride (CO_2)	39·40	38·90	38·50	39·40
Calcium carbonate ($CaCO_3$)	79·92	79·23	85·96	86·91
Calcium sulphate ($CaSO_4$)	4·32	4·08	3·72	2·44
CO_2 in excess	4·24	4·04	0·68	1·16

Outside.	0″–¼″	¼″–½″	½″–¾″	¾″–1″
Moisture	0·90	0·80	0·60	0·90
Insoluble in hydrochloric acid	4·00	2·80	3·00	2·80
Oxides of iron and alumina ..	1·70	2·60	2·70	2·60
Calcium oxide (CaO) ..	50·23	51·01	51·29	51·40
Carbonic anhydride (CO_2) ..	41·20	41·80	41·70	41·80
Calcium carbonate ($CaCO_3$) ..	87·73	90·37	91·21	91·44
Calcium sulphate ($CaSO_4$) ..	2·68	0·98	0·51	0·46
CO_2 in excess	2·60	2·04	1·57	1·57

It is evident, then, that great care should be taken both in the methods of heating and lighting these valuable buildings.

There is, however, another possible source of mischief, to which sufficient attention has not been devoted. My attention was first directed to it by an inquiry which I made into decay of the stone taking place in the Bowes Museum. I found that this decay was taking place principally on the lower portions of the building, and that it was due to the crystallisation in the stone, not of sulphate of lime, but of sulphate of magnesia. Now in the case of a magnesian limestone, such as that from which the House of Commons was built, sulphate of magnesia is often found as the destructive cause, but the analysis of the stone and the mortar used in the building of the Bowes Museum showed only traces of magnesia, while in the cellars of the building it was possible to scrape off masses of efflorescence from the walls consisting of almost pure sulphate of magnesia crystals. Owing to the fact that foundations were being made for a new building, I was able to get hold of some of the subsoil some 8 feet down where it was in contact with the rock, and an analysis of this subsoil showed a high percentage of sulphate of magnesia, and there can be no doubt that the source of the sulphate of magnesia was to be found in these subsoil waters.

In this particular building a series of mistakes had been made—in the first place in the selection of a site. The building was on sloping ground with a considerable area of high ground behind it, and the dip of the strata was such as to cause a banking up of water under the building coming from the high ground behind. Moreover, the concrete floor inside the building was some 3 feet above the level of the dampcourse outside, and on digging down through the floor wet soil was found to be resting against the level of the walls above the level of the dampcourse. The dampcourse itself was very imperfect, being made of a mixture of tar and sand which had crumbled and broken up.

We had here very extreme conditions, but it directed attention to the importance of considering this matter of subsoil waters, and there have been other cases found since where the destruction has been caused by sulphate of soda which has been absorbed from the soil. It must not therefore be assumed that in all cases the presence of sulphates is due to sulphur acids in the air, and the whole question of the drawing up of water containing salts into the walls is evidently one of the first importance. It is therefore necessary to consider both the geological conditions of a site in which an important building is placed and also to be sure that an efficient dampcourse has been introduced which will stand the test of time.

There can be no question that the most important cause of rapid stone decay to-day, especially in our towns, is the crystallisation of sulphate of lime within the stone or brick. It is necessary to investigate this matter further, and therefore in the first place we have to consider the selection of a suitable material to stand the conditions in modern cities. Dealing first of all with the question of stones, and ruling out the more specialised and expensive stones, such as granite, it is necessary to consider the respective merits of the ordinary building stones.

In the South the building stones principally used are oolitic limestones, while in the North sandstones are very largely used for building, but sandstones vary in the amount of carbonate of lime, in the form of calcite, they contain, some sandstones consisting of particles of quartz cemented together by silica, and therefore not attacked by sulphur acids. But sandstones which contain large quantities of calcite, the calcite being itself the binding material, are peculiarly liable to disintegration when attacked by sulphur acids. The following experiments illustrate this very clearly. If we pour some acid on to some broken pieces of Portland stone, it will be seen that a brisk effervescence takes place of carbonic acid, the stone being rapidly dissolved. If we now pour some acid on to fragments of a sandstone containing a considerable quantity of calcite, we see the same brisk effervescence, and the sandstone is rapidly disintegrated into the loose sand. If, on the other hand, we take a sandstone, such as the Cullaloe stone, which was used by Sir Robert Lorimer for the Thistle Chapel in Edinburgh, we find that the acid has no effect upon it. It is obvious then that the problem of building

permanent buildings in those parts of the country where sandstones are available is a comparatively simple one. There are no doubt many other properties to be investigated and many experiments to be made before it can be decided which of all the different varieties of sandstones are the most durable, but at any rate it is a simple matter, by means of an analysis of the stone, and, moreover, an examination of the effect on the stone of the attack by acids, to eliminate those sandstones which are unsuitable for building purposes.

The method which I have adopted for testing stones has been to have them cut into little cubes all of as near as possible the same size, expose them for a certain length of time to hydrochloric acid vapour, wash them in running water to remove the soluble salts formed, dry, weigh, and again expose to acid vapour and again wash, and so expose them to repeated attack which approximately corresponds to what happens under natural conditions, the main difference being I selected hydrochloric acid because it produced an acid vapour and because the products of its action are easily washed away.

The following illustrates the result of certain experiments made upon samples of millstone grit taken from three quarries within about a mile of each other. The stones from these quarries are very similar in appearance, and had been used indifferently in an important building. Some of the stones in the building were rapidly decaying, while others were weathering well. As far, therefore, as appearance went, they seemed to be of the same quality, but on being subjected to the acid test with Craigleith stone as the standard stone, it will be noted that while two of them were reliable, the third was rapidly decomposed. This shows the importance of having proper tests made of stones, even if they are of similar appearance and regarded locally as being of the same kind.

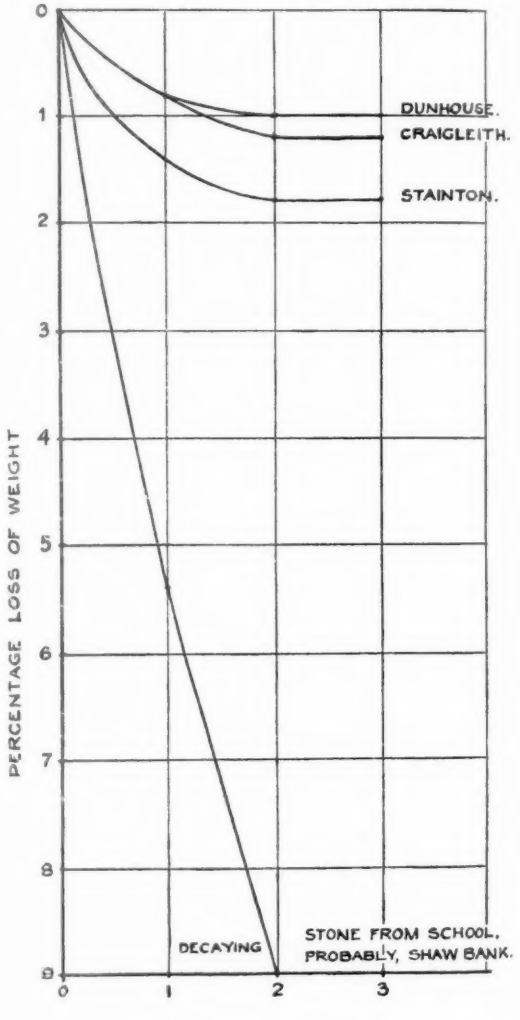
When we come to the question of limestones we are in a greater difficulty, because all limestones are attacked by sulphur acids. Here again the acid vapour test enables us to classify limestones, as is shown by the following figures.

ACID TEST.

Loss of Weight.

A	7·2
Caen Stone	6·5
Portland Stone	3·2
Lincoln Stone	1·2

It will be noticed that Caen stone and another limestone, which, being an article of commerce, I prefer to call A instead of giving its name, both behave badly. The Portland stone is better,



while the oolitic limestone of which Lincoln Cathedral is built shows remarkable powers of resistance. This agrees with the experience of those in charge of Lincoln Cathedral. Whenever they have used other limestone for repairs they have found it to decay.

If one is to speak as a purist, the right building material for London is the London Stock Brick or a brick of equal quality which has stood centuries of exposure to London conditions with remarkably little decay, and the use of limestone in London is obviously from the scientific point of view unjustified. It is true that some of the older buildings built with Portland stone, although decaying, have stood up wonderfully well, but it is questionable whether the Portland stone erected to-day is standing as well. If I am right in this statement, the reasons for it are worthy of investigation.

But if limestones are to be used, it is obvious that there are limestones and limestones, and also the tradition of Portland stone is justified by those acid tests, although the Lincoln Cathedral stone seems to be even better.

It is now necessary to consider more closely this question of crystallisation. When once a centre of crystal growth has been formed the tendency is for that crystal to continue growing rather than for new centres of crystallisation to be started and ultimately to exercise an enormous force with destructive consequences. Moreover, there is a tendency for the crystals to grow in tiny cavities within the stone. If we introduce a solution of a salt into a capillary tube, open at both ends, but with one end in a saturated atmosphere and the other end exposed to evaporation, in most cases the concentration taking place at the evaporation end increases the surface tension and draws the solution to the end of the tube, the crystallisation of the salt taking place at the end of the tube.

The importance of this in connection with stone preservation is obvious, as it is not only a question of how deep the preservative sinks into the stone, but how far during the subsequent drying out they are drawn to the surface.

But to continue on the point we are discussing. If we imagine a small cavity inside a stone into which capillary tubes containing salt pass, then as the stone dries out and the outer side of this opening is exposed to air, while the inner side is in communication with the capillary tubes, the tendency will be to draw the solution from these capillary tubes into the cavity and cause crystallisation to take place there. There is undoubtedly a continual movement taking place of a slightly soluble salt like calcium sulphate within the stone. If, for instance, we saturate a little piece of plaster of Paris with a crystallisable salt which is able to take up moisture and put in dry air, the salt crystallises on the surface, and on now putting it in moist air the salt redissolves and is drawn into the plaster of Paris by capillary suction. It is the changing conditions of moisture in the air of a damp climate like ours, causing absorption of moisture and evaporation of moisture and slow movements of the sulphate of lime in the stone, which are the main cause of destruction. I shall have more to say on this question of the movement of salts presently, but I have said sufficient to show how complicated this question is.

It will be noticed that in the case of the analysis of the stone inside Lincoln Cathedral there was a very heavy percentage of sulphate of lime contained in the surface of the stone, yet that stone is not disintegrated, but sulphate of lime is lying harmless within the mass of stone, but as soon as moisture and changed conditions of moisture are present, then it is that the trouble begins. The following experiments, showing, in the first place, crystallisation itself, will bring vividly before our eyes what crystallisation means. I have also here three slides, one a micro-photograph of the sulphate of lime crystals lying inside a piece of stone which fell from Elgin Cathedral, and the other of sulphate of magnesia crystals lying within a slice of stone which peeled off the House of Commons. The third slide is a micro-photograph of crystals lying within a cavity in the Tower limestone, taken by Mr. Scott Russell, who has devised a beautiful method of obtaining sections of rotten decaying stone. It is evident, then, that crystallisation of these salts and the conditions under which it takes place is the principal question which we have to study.

But this question of the moving of water has a wider significance. It has been customary to consider a stone or brick as if it was an isolated object, and not to remember that it forms part of a wall surface in which there is also mortar or cement. In the case of a building made of large blocks of stone with very thin jointing, the question of the mortar or cement is probably not of importance, but in the case of a brick building or a stone building in which there is a considerable amount of mortar surface we cannot leave the mortar out of consideration. Now the mortar is composed of a mixture of lime and sand, and if cement is used it also consists of lime compounds in which a good deal of free lime is present, and all of which are

more or less attackable by sulphur acids. It is evident, then, that in mortar or cement we have as a source of supply sulphate of lime which may, under certain conditions, be drawn into the brick or stone, and therefore, even though we use a silicious stone or a brick free of itself from soluble lime compounds, the destruction may be due, in the first place, to the formation of sulphate of lime within the mortar or cement, and, in the second place, the drawing of the solutions of the sulphate of lime into the brick or stone and there crystallising *in situ* with the resulting destruction.

There are some cases of rapid brick and stone decay which are evidently due to this cause. In the case of one brick building where the bricks were rapidly decaying, although the brick itself was practically free from any lime compounds, the decaying surface contained in some cases as much as 12 per cent. of sulphate of lime, and the following slide shows rapid decay which has taken place in a repointed building in which a mixture of cement and lime had been used, a building which had stood for centuries. This is very significant. In the case of Elgin Cathedral the evidence there is that the rapid decay which is taking place is due to sulphate of lime, the source of which must be found in the pointing material.

It is evident that, while this sometimes takes place, it does not always take place, and therefore the conditions under which it sometimes takes place require careful investigation. In some experiments which I made I was able to show that if of the whole exposed surface one portion was evaporating more quickly than another, after rain, other things being equal, water containing salts would be drawn into that surface. But this is not the whole of the problem.

The question, therefore, of the movement of water in the face of a wall is a very complex one. I do not feel that I have done more than open up the question for scientific inquiry, and I myself am carrying on some further investigation, and it has also been taken up by a colleague of mine and by some of the brilliant investigators we have at the Department of Scientific and Industrial Research. I am disposed to think that this question of the movement of water on the face of a building carrying salts in solution may not only enable us to explain much that is now happening, but also guide us in methods of building which will enable us to make crystallisation take place where we want it to take place, and therefore protect valuable surfaces, and in addition enable us to preserve successfully decaying ancient buildings.

It is evidently closely connected with the whole question of stone preservatives, as they are called. These may be roughly classified into organic preservatives, such as paraffin wax, linseed oil, china wood oil, solutions of resins and metallic soaps, and into preservatives which are meant to act upon the carbonate of lime contained in limestones and some sandstones with a view to forming insoluble compounds such as silicates of soda acid, or potash, arsenic acid and aluminium sulphate, and fluosilicic acid and its salts. To this I may be allowed to add the preservative which I thought I had been the first to suggest, but found afterwards it had already been suggested many years ago by the German chemist, Hoffmann, and that is Silicon Ester, a liquid which, thinned with alcohol, can be soaked into a stone and deposits a layer of hydrated silica as a cement.

The problem that Silicon Ester was devised to solve was a special one. I had been asked by the Office of Works to see what could be done to preserve the crumbling stone carving and moulding, more especially of the sandstone ruins of ecclesiastical buildings in Scotland. It was necessary to re-cement the crumbling surface just as it was, without any brushing, and in the first instance I used a weak solution of rosin in a solvent like toluol. This penetrated well, cemented the stone together, and did not produce scaling. Owing to the fact that the rosin itself weathers, after about five years surface decay began again and a fresh spraying was necessary. I therefore searched for a liquid which would deposit an indestructible cement, and this was found in hydrated silica. The Silicon Ester solution as it dries out deposits a colourless cement of hydrated silica round the particles of stone. At the same time it has a protective value. Since I first tried it much valuable research has been done on the use of this solution. It has been improved in manufacture, and it has been found that it is necessary to adjust the solution according to the variety and general condition of the stone or brick to which it has to be applied. Reconstructed stone which can be carved has been made with it, and a mortar free from lime, and it has also been used as a medium for fresco painting.

To deal generally with the question of stone preservatives it must be remembered that there is no stone preservative which absolutely protects the

surface of the stone from the action of acids, as is shown by the following figures :—

EXPERIMENTS ON CAEN STONE TREATED IN DIFFERENT WAYS.

LOSS OF WEIGHT ON TREATMENT WITH ACID VAPOUR.

	Hrs. 24.	Hrs. 24.	Hrs. 24.	Hrs. 24.	Hrs. 24.	Days 5.	Total.
	Acid Renewed.						
Untreated	3·6	6·0	3·1	5·7	4·8	7·2	30·4
Fluo 5 per cent., 10 per cent.	2·5	4·4	2·3	6·3	4·2	8·8	28·5
10 per cent. Resin ..	2·1	3·3	2·5	3·6	3·6	4·2	19·3
Silicon Ester ..	2·0	2·2	2·0	3·8	2·4	4·0	16·4
Paraffin Wax ..	2·0	1·5	2·0	1·5	2·0	3·0	12·0

By the attack of hydrochloric acid vapour on small cubes of Caen stone, it will be seen that even the stone boiled in paraffin wax is attacked. The difficulty, therefore, of the problem is that a certain amount of attack will continue within the stone, that this will produce sulphate of lime crystals, and that, therefore, sooner or later the sulphate of lime crystals will begin again to break up the surface.

From what I have already said it is evident that the question of preserving a decaying building is a very complex one, and requires very careful investigation of all the conditions of a particular case before any action is taken, and it is not only very often useless, but in many cases dangerous, to apply the stone preservative without thoroughly understanding all these conditions. Stone preservatives have their uses, but only when applied after careful scientific investigation of the problem, and then by those specially trained in methods of application.

A group of capable experts have now been for some years at work upon this problem, dealing with actual cases as they arose and gaining every year in knowledge and experience. Materials such as Silicon Ester have very valuable uses, but it is necessary to warn architects against their application without preliminary scientific investigation.

It has been recommended by some of the German chemists and by the Department of Scientific and Industrial Research that the amount of free lime in mortar should be reduced and that substances in the nature of pozzuolana should be introduced with a view to forming compounds of lime which are fairly insoluble, thus returning to the practice of the builders of Imperial Rome, who mixed pozzuolana or similar materials with their mortar. Such materials are Trass, found in the neighbourhood of the Rhine, and burnt clay or crushed bricks, and they had in Scotland an inexhaustible supply of such material in the heaps of burnt shale lying on the oil fields in the neighbourhood of Edinburgh.

To depart from the problem of patching up buildings in which decay is taking place to the problem of construction and the choice of material, it is, I think, obvious that architects have not given sufficient attention to these two questions. In the first place, it is evident that there should be no difficulty in the choice of a suitable sandstone, and that limestones vary in their capacity to stand attack ; that the aim should be, where limestones are used in such a climate as London, to produce flat surfaces and avoid cornices, where moisture will linger. The rain-washed surface stands the attack fairly well, but it is the changing conditions of moisture and the movements of salts within the stone, caused by its changing conditions of moisture, which are the main source of decay.

It is also important to obtain as dry a wall as possible. A very interesting paper was read a few years ago in London by Monsieur A. Knapen on the treatment that he applied to Versailles by opening ventilating passages along the foot of the walls so as to cause a movement of air within the walls themselves. I am disposed to think there is a good deal in this, and that it is not only necessary to have a reliable dampcourse, but there should be ventilation above the dampcourse and into the interior of the wall, and that it is worthy of consideration by architects whether there should not be air passages through the whole height of a wall so as to get the wall as dry as possible. Hosing down all wall surfaces, especially under cornices and carvings, two or three times in warm weather should be done so as to cause the rapid crystallisation and washing away of salts. This would probably do a good deal to preserve these limestone buildings.

The whole subject, as will be obvious, is a very difficult and complex one, but progress is being made. Certain practical conclusions have been arrived at, and now that more than one group of trained investigators are engaged on the problem, still more rapid progress may be expected.

(*Discussion overleaf.*)

Discussion

THE PRESIDENT, MR. WALTER TAPPER, A.R.A., IN THE CHAIR.

Professor LAURIE: If architects will build London of stone instead of stock brick, they should at least get flat surfaces to their buildings. Wherever there are elaborate cornices you will have moisture under the cornices and sulphur acids will accumulate there, and dirt, and smoke, and there will be movements of moisture inside it, and sulphate of lime breaking it up. But if you have a flat surface which is washed by rain, it will last a long time. It is not rain that does so much harm. Therefore we should make buildings as flat as possible if we use limestone. And we cannot be too careful about damp courses. For one thing, we should consider geological conditions, and not only the question of getting a safe damp course. It is a good idea to ventilate, as was pointed out by a brilliant French engineer, who used open tubes so as to get ventilation from the interior of the walls. That idea is sound. There is no reason why we should not have ventilation inside the wall above the damp course. That raises the question whether we should not have vertical tubular construction so as to get the walls as dry as possible. It is sulphate of lime *plus* moisture which is the destructive agent, and if we can only keep our walls dry they will last better.

Dr. R. E. STRADLING (Director of Building Research, Department of Scientific and Industrial Research), in proposing the vote of thanks, said: I do agree with Professor Laurie that he has taken for his subject perhaps the most difficult of all the branches of building science work. A large number of investigators have worked at this problem for a very long time, and we are lucky enough to have some of these early workers, of whom Professor Laurie is one, on the Chemical Weathering Committee of the Building Research Board. And in return for his very kind references to our own work I would like to express our very great indebtedness to the members of that Committee, who are helping us from time to time with their advice.

With regard to one or two general points which Professor Laurie has brought up, I think the matters he has stressed, about the kind of selective delay that takes place when you associate various materials together is probably the most important thing which has come out of the work in recent years. There is one point he referred to in the work of the French engineer, Knapen, which that worker discussed in London two or three years ago. The principle of his dampness "cure" is the insertion of little clay tubes into the structure. It proved to be particularly effective in the work at Versailles. I think it is the same principle as that which Professor Laurie has been mentioning, not so much for keeping the walls dry as supplying a material which has a high capillary head compared with the surrounding material. I think that perhaps the very safeguard which Professor Laurie has suggested is the only one likely to be got for the protection of existing buildings, that is to say, to try to make in the joints an outlet for the salts which must inevitably otherwise come out through the stone. If you do not create such an outlet in it, you will bring about the kind of decay which was so well shown in the photographs.

Mr. H. D. SEARLES-WOOD [*F.*], in seconding the vote of thanks, said Professor Laurie has completely controverted a principle which we were taught in our early days. The idea of leaving out all weatherings and throatings and cornices may be a joy to the modern young man, who seems to have "collared" Professor Laurie and got him to support their principles of design. We thought it was necessary to keep walls dry by putting up heavy mouldings and throatings, so as to throw the water off a good part of the building. It was, I think, in 1910 that I was at the Brussels Exhibition and saw there the first applications of Knapen's principles of ventilating the walls, and I brought it over to London and read a short paper on it. It has been a great surprise to me that it did not take on in England more than it did. It seemed to me to be a system which was well worthy of being applied to some of our buildings. I do not know why it has not been more generally adopted here.

Another point which Professor Laurie made was with regard to the construction of our walls. I noticed that where you grout walls and make them absolutely solid, they are very much more liable to decay than when you do what the jerry-builder does, butter the perpends and leave voids inside. Often you get a drier wall in that way than in the case of an absolutely solid wall.

Mr. E. P. WARREN [*F.*]: I have had much to do with repairs at Oxford. Much of the building at Oxford consists of the worst stone I know of in this country, or anywhere in any country. Up to the time of the Black Death—and, I think, on account of the hiatus wrought by the Black Death—Oxford was tolerably built; such structures as Merton, New College, and the oldest buildings in Worcester College, are well built. I think the Black Death, killing off many masons, particularly at Oxford where the incidence of the Black Death was particularly heavy, probably accounted for the fact that a serious change took place in the manner of building there from 1340 onwards, and it never got back to the original

mason craft. But Oxford possesses, two miles away from the City, a quarry of Headington stone. The old, hard measures, which are difficult to get at, a thin stone, really hard and particularly good for paving and for steps, if placed face-wise, have been used with stable and good results in the bases of buildings and for overhanging mouldings. But the Headington stone, especially the soft variety, is the worst stone I have seen in my life. After the 15th century, people discovered that it was an easy way to get the effect of large blocks of stone if they quarried this Headington stone and set it on its face; and, for a few years, it looked handsome in the wall. They used this all over Oxford in the 16th and 17th centuries. Oxford, unfortunately, is a damp place, and one which is liable to sudden frosts. At Oxford, in the winter, you will sometimes get, between 4 o'clock and 6 o'clock, a fall of 12 or 15 degrees Fahrenheit, which is a serious matter. When this supervenes on the soakage of this soft stuff, face-bedded, you can imagine what the result is. This stone will take in water for an inch from this surface, and the result is that the expansion caused by the freezing of the water in the face of the stone pits it, blows it into bubbles, and disintegrates it, and altogether defaces it dreadfully. Frequently in climbing about buildings in Oxford one can find blisters blown out from behind, and I suppose it must have been partially formed by the action of the gas which was confined and was trying to force its way out, and sometimes succeeding, from this soft stone, a mere skin, left on the face of the Headington stone. If you punch one of these blisters, it pours out sand and comes to pieces. It is very difficult to repair stone work of that order, and usually, if it seems to be very rotten, it must be cut out. Generally, it is only 5 to 7 inches thick, or it may be only 3 or 4 inches. But people in Oxford have cut off the rotten face and attempted to dress the surface of the stone behind with various preservatives, sometimes with lime. The preservatives which have been used at Oxford until lately have been a signal failure, and I think it is because the inventors of them, or the people who make them, have thought that the great thing to do was to get a silicious face upon the stone. Buildings in all towns, in fact all buildings, are liable to slight motion, and in Oxford that is specially so at the present day; with its large and heavy motor traffic, in narrow streets, the buildings are constantly shaking. All buildings move because the earth is moving slightly under their foundations, especially if those foundations be clay or gravel. Hence, to put a non-resistant silicious coating on to such moving buildings is fatal, there are always cracks resulting, which you can see at any time by using a lens. After a sufficiently long experience since the War, to see what happens, I think the last solution of Professor Laurie, paraffin wax, is the best thing I have tried, because it gives an oleaginous coating, which allows of the slight expansion necessary to accommodate itself to the moving building and its vibrations. I think it will be the opinion of most people who have used silicious coatings that they are a dead failure. I have used this paraffin wax for five or six years, and some of the buildings I have used it on have been very badly exposed to rain, yet they have stood very well.

With regard to the remarks about overhanging cornices, I think the overhanging cornice on a building, if it is of considerable height, is very necessary, because, even in still weather, the rain seems to be attracted towards the building, and if the projection of the cornice is not great the rain will not fall far before it wets the building, and so there will be a line of wear on the building, which I have noticed on several occasions. It was particularly so on Magdalen Tower, which I repaired in 1921. It has a considerable cornice, which saved 20 or 30 feet of the wall below it from the drip. It can be done, in the way of repairs, by the proper use of ordinary good lime mortar, and, here and there, by certain kinds of cement. There is a particular kind of cement made of ground Cotswold stone, which is made in the Cotswolds, and I have found that it acts very well, and it is hardly distinguishable from the stone itself from a distance of 20 to 30 feet. It seems to be a good method of mending fractures and stopping holes.

The first solution of the question of good building in stone must be the selection of stone suitable for its purpose and position, and then the use of a stone of that kind on a proper bed will stand. Granite will stand almost anyhow, and there are other stones which can be end-bedded or face-bedded with safety. A study of mediæval and ancient masonry of Greece and Rome shows that the cornice was believed in, and, from my observation, I do not think we should be safe in doing away with cornices, on stone buildings at any rate.

The action of different stones is curious. There is a stone, a half-sandstone, which I came across in Derbyshire, which behaved in a way I cannot account for, and could not account for then. The overhanging string course, the whole of the upper surface of that course, took the direct drip of rain and was in good condition, but the underside, which was protected from the rain, was rotting away. That I have not seen in the case of any other stone; I have not found it at Oxford with soft stone, nor in buildings faced with such stones as Portland or gypsum. The stone we are using for repairs at Oxford, which seems to stand extremely well, is gypsum, from Rutlandshire. It is of good quality, and very soon assumes a pleasant grey colour.

I should, therefore, like to hear what Professor Laurie has to say about the difference, as a preservative,

between an oleaginous coating and a coating of anything like a silicious material.

Mr. W. A. FORSYTH [*F.*]: I can only refer to a few notes spasmodically, because there is so much matter in this subject that it is difficult to frame one's remarks so as to give them in a continuous thread.

I was very pleased to hear Professor Laurie say that the action in decaying stone is a slow one, but the action we had depicted on the screen in the experiment was a very rapid one. It shows we shall never really get to the bottom of this subject until our field experiments—that is to say, our building research—have been spread over many years, and until the ideas which have been put into operation have had a chance of coming to fruition.

I was most interested in Professor Laurie's statement regarding the expansion of stone in some of the Scottish buildings. It does exist, but I have not met with it in stone. I quite understand that two faces of a stone building being subjected to expansion, this expansion would have greatest effect at the corners and produce fracture. Probably the expansion is greater on the wet surface.

I ask if Professor Laurie has studied the penetration of moisture into the depth of stone? Sometimes there are silicious veins in limestone which dip inwards, sometimes they dip out. Also, does he recommend big joints, or little joints? Dr. Stradling said it is necessary for salts to escape, and Professor Laurie says keep down the lime. Some of the best repair pointing done to-day is undertaken by the Office of Works. They have a rich mixture of lime with sand, and they take a good deal of water-worn sand and mix it as a coarse mortar. When the mortar is finished, a wet brush takes off all the surface lime, leaving a marked exposure of sand or pebbles, as the case may be. That has the advantage of protecting the mortar from erosion, and it may protect the mortar from getting excessive moisture. The difficulty we are up against, I think, is that we have to strike a balance between natural moisture and excessive moisture in order to provide conditions to establish a proper evaporation, or absorption, as may be required.

Professor Laurie also referred to the effect, in the interior of buildings, of heating and gas-lighting. That is a most important matter, because you may see a stone interior which has remained intact for hundreds of years, and then a few years after artificial heating has been applied moisture has been extracted from the stone and it shows evidence of failure. King's College Chapel, Cambridge, has recently had applied to it artificial heat. I think in such cases you should at the same time supply moist air, with the object of restoring the loss from evaporation. There may be somebody present who is responsible for this, but I hope not. You have in that building a wonderful stone vault of very tender construction, which is relying for its condition on its mortar and the natural moisture remaining in the stone. If you cause that moisture artificially to evaporate, you should at the same time reinstate the condition by admitting moisture. I should like to hear whether Professor Laurie agrees with that.

Then there is the question of solid walls. Half my life is taken up in seeing that bricklayers put mortar in the walls. I find that buildings are often erected with but little mortar in the joints, leaving hollow spaces behind, and into such hollows moisture penetrates very easily. The alternative is to build a hollow wall. But there is no strength in that if you are on a treacherous site. Good mortar to keep out driving rain is better than anything.

The causes of stone decay which Professor Laurie has told us of to-night are, mainly, attack from the sulphuric acid in the atmosphere. He touched briefly on attack by bacteria. This idea has not been held very long; it was started in 1910 by Dr. Tempest Anderson, and has been carried on by Professor Marsh, of Oxford. I understand that the attack by organisms, such as fungi, mosses, and other bacteria is very detrimental to stone, and the attack is very definite. For a preservative from this form of attack Dr. Tempest Anderson chose sulphate of copper, which acted by poisoning the microbes which had penetrated the stone, but it prevented the evaporation of moisture, so that it was retained. I would like to refer to my experience in this matter. I have for years been watching the effect of copper wash on stones, and my investigations have taken me further than stone; it preserves brick work, plaster work, wood work and other things of the kind better than anything I have seen produced yet. On many buildings in London and the provinces one sees the effect of rain water running over copper and dissolving, in its passage, some element—I cannot say what it is, I think it is sulphate—which kills organisms which attack these materials. It certainly in some way preserves the brick, stone, and other materials I have mentioned, and restores it to its original condition. In one of the papers which Professor Laurie contributed to our JOURNAL he recommended covering the cornices of buildings with lead. What is preferable, I think, is covering the cornices with copper. Whereas one would cover a cornice wholly with lead, when using copper you need only cover a little piece. In all the buildings I have erected during the last five years I have used copper persistently on cornices and such like projections, because the washings from the copper preserve the stone with which they come in contact, especially limestone, better than anything I have tried. I am also trying silicon ester. That is of great value, too; it leaves the stone porous.

Mr. Warren has referred to a glassy silicious material being put on stone, and said it failed. He is quite right, and I agree it has to be avoided.

I ask if Professor Laurie will say whether he has tried copper sulphate solution ?

Sir RICHARD ALLISON [*F.*] : Professor Laurie's paper has been most interesting and informative to me ; but with regard to the Office of Works, we are still waiting for some reliable method of arresting decay of stone, particularly in ancient monuments and historic buildings. Professor Laurie, I may say, has assisted the department for many years. Twenty years ago, I think, he was called in on some matter and he has experimented in certain places with silicon ester. I think we have tried, in addition, every known preservative, with the hope of finding some reliable process ; but we have come to the conclusion that we are not justified in proceeding on a comprehensive scale with any known method of so-called stone preservation. It is a rather tragic position for us, because we are faced with some of the most difficult problems in connection with stone decay that we can have. At the Houses of Parliament we have a particularly difficult problem. In this case, though there is a certain amount of surface decay in the magnesian limestone, a much more serious difficulty to be dealt with is what appears to be an inherent defect in the stone. We have found innumerable places where the stone can be picked away by the hand, as the result of cleavage beds, or open vents in some instances, loosening the stone and making the conditions really dangerous. To what extent cleavage beds may be found in oolitic limestones I am unable to say, but, in my experience, even with Portland stone, I have found places where one could pick a piece from a crocket, for instance, with the slightest pressure. It suggests that this particular defect is not entirely confined to magnesian limestones. But, clearly, with the stone at the Houses of Parliament the defect seems to be very marked indeed. To what extent the conditions there are due to the want of proper supervision at the quarry, and even at the building, it is difficult to say, but evidently there was much to be desired in this connection at the time the Houses of Parliament were built. The evidence produced before the Commission of 1861 showed that there was a good deal of faulty supervision, and, I should imagine, the enormous quantity of stone required led to practically everything obtainable from the quarry being sent to Westminster and put into the building. I was talking to the Director of the Geological Museum the other day on this question, and his remark to me was, " Look at the Piccadilly front of the Geological Museum, which was built of the same stone as the Houses of Parliament." He asked me if I had ever seen a limestone front in better condition. After exposure in London for 80 years or so, I was bound to confess that, judging from its appearance as seen from the street, it was a remarkably good and well-preserved piece of stonework. The suggestion was that if there had been proper selection of material for the work at Westminster, there would not have been the trouble we are faced with now. Sir John Flett told me that his predecessor, at the time the Museum was erected, made it clear that every stone which came to that building would be inspected by him, and that if it was not up to standard, it would not be put in.

It is a big problem that we have at Westminster, but there are many cases of ancient monuments and historic buildings in connection with which stone decay trouble exists, and we should be only too happy to find some remedy that we could really rely on. With a Government Committee, under the Building Research Board, dealing with the difficulties of stone preservation, there is no question that now the whole matter is being very exhaustively investigated, from A to Z, and I should imagine that by the time the work of that Committee is concluded there will be little more to be said on the question of decay in stone and preservation possibilities. Final conclusions may perhaps unfortunately not be particularly helpful to architects ; one cannot help feeling a little gloomy on the subject at times, because the problems are so abstruse that one wonders whether a real and practical solution will ever be found. But, even if the final results prove to be more or less negative, the work of the Committee and the enthusiastic band of scientists under Dr. Stradling will not have been in vain ; we architects will at all events know where we are, and we shall be able to assess the value of so-called preservative processes with some decree of certainty.

Mr. ALLEN HOWE : I do not think architects need to feel worried at all about preservatives ; cut them all out ! It is not science, perhaps, but I challenge any scientific man to show how he can use any preservative whatever—oleaginous or silicious, or what not—with a satisfactory result. I do so because if you use a preservative on a stone, whether sandstone or limestone, you at once do one of two things : you either destroy its appearance as a stone, or you put a skin on it, which, in the end, will cause trouble worse than before. All are agreed about that. What we ought to do is to get down to the essentials of the matter. If we could make up our minds—professional men, laity, all together—what we want when we build a stone front, whether we desire the charm of colour and texture and tone of the building or not, then if that is what we want, we must not put on any preservative. But we could keep it clean. Here, in this town, and in every town in England, architects take trouble to design buildings, often of extraordinary beauty. The main form is good, the ornament, when it is there, pleases when new. When we see old build-

ings which have been modified by time, we may like them even better. But if we could keep the proper atmosphere and colour of that stone all the time, we should not only satisfy the public who want to enjoy it, but satisfy the architect, because it would maintain his original intention, and we should be doing the stone some credit by keeping it in the best possible condition. Do we want to preserve the form, the appearance and the tone of stone? Or do we want merely form? If the latter, we may as well put on colour wash, as we often do now; put daubs on to our stone buildings. Look at the Athenæum to-day, nicely painted. But it is satisfactory because its form and detail stand revealed. There is nothing harmful in paint as a protective for material. A distinguished member of this Institute once said paint was a very satisfactory material for preserving stone, and I agree with that. The whole questions is: What do we want? If we make up our minds as to that, the coast is fairly clear. If we wish to keep in stone its original character, all we have to do is to wash it down, whether it is sandstone, or granite, or limestone. Then we get rid of dirt, we wash off the salts, which it has been explained this evening cause great trouble, whether they come from the air above or the earth beneath, it is all the same. The Goldsmiths' Hall, referred to by Dr. Laurie, has been washed down regularly, and with very good results; but certain parts of the plinth have suffered notwithstanding, and have scaled.

Mr. ALAN MUNBY [*F.*]: Professor Laurie and I worked in the Cavendish laboratories at Cambridge at the same time. He does not remember me, but I remember his fame from those distant days, and most of us will know Professor Laurie's work on paints better than we know his work on stone. I refer to the excellent work he did, and is still doing, on the ancient paints which have stood so well, those of Eastern origin; and he has given the same care in his investigations on stone and preservatives.

With regard to stone, I would follow up the remarks of Mr. Forsyth. I called on Professor Marsh at Oxford not long ago, and looked at some of the specimens in his laboratory. I was very much struck with the results which he had obtained. He drew my attention to a series of black marks, which were due to some plant growth on stone, and his treatment seemed to have kept them down and removed them. He did not advocate the use of copper sulphate. He used caustic soda solution, and he advocates putting a certain amount of caustic soda into the mortar joints, his view being that the bacteria are killed by alkali as well as by acids. I have "cribbed" Mr. Forsyth's method of using copper. I have only one building in which I have tried it at present; in the West of England in which I have these strips of copper, the results may give a check to Mr. Forsyth's enthusiasm with regard to the effect of copper sulphate on buildings.

With regard to the tubes which produce porosity in walls, I have had one experience of them. I used ordinary drain pipes. It was not a case of decay, it was a case of a damp internal wall in a house in which it was impossible to put a damp course. I put in short lengths of an unglazed drain pipe, and no doubt the drying effect in those areas must be very considerable.

I was very interested to hear what Mr. Howe told us; it is cheering to find that we can sweep aside some of these problems. But Mr. Howe did not refer to the enormous help which the Geological Museum has given to us in connection with our stone experiments. It is now many years since, as the outcome of a paper of which I was the author—the last paper which was read before the Architectural Association in the old library upstairs—it was suggested by Mr. Howe that we should make experiments upon the roof of the Geological Museum, by exposing specimens of common building stones for test. They have been up there nearly 20 years, and there has been an examination of them each ten years; the originators who live long enough go up every ten years, and a report is made. And very interesting photographs of those stones have been taken, showing their original condition, and the condition they have assumed as time passes. Therefore, in the next decade, we should get some information as to the result of straightforward weathering on flat surfaces of about a dozen common building stones in the London area. Our thanks are due to Mr. Howe and his colleagues for their work.

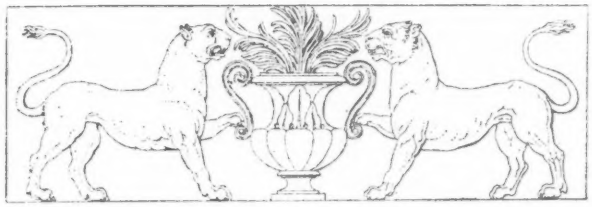
The CHAIRMAN then put the vote of thanks, which was carried by acclamation.

Professor LAURIE (in reply): So many questions have been raised in the remarks concerning the vote of thanks that I think you will feel I ought not to reply to them unless you want to continue here for another hour. I have heard before of this question of copper sulphate. I hope Dr. Stradling will have noted the questions for a laboratory enquiry. I was very pleased to find Mr. Howe agrees with me about the simple business of putting a fire-hose on to our London buildings, especially the cornices, so as to wash them down.

On one point I do and I do not agree with him, and that is about the real use of stone preservative. For an architect to buy a stone preservative, whatever it is, and smear it over a building, may produce temporary hardening of the surface, but it will not do any permanent good. The rotten surface of the stone of priceless carving and mouldings must not be touched with a brush, you must use cementing solution

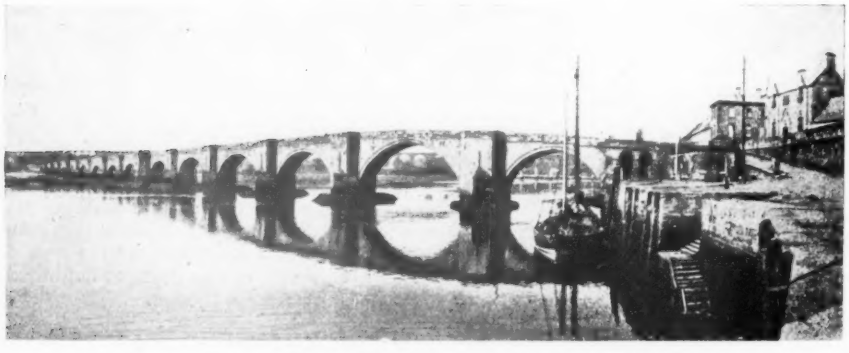
which must be sprayed on to bind the particles together. The purpose of preservatives is to harden the loose crumbling surface. You must do this with new cementing solution as the old cement is gone. But you must also go into the question of the movement of the stone particles of salts in the material. If we understand this movement aright, we can perhaps combine the two things, replace the destroyed cement by a new cement and at the same time prevent further decay by arranging the travel of the salts in the direction we want.

There is much research going on outside ; there is a brilliant group of men with scientific training who are dealing with problems of this kind every day, who are getting valuable information from dealing with actual cases. I am satisfied that for an architect merely to apply a preservative to a building, like applying a plaster, is very little good ; preservatives must be used after a careful scientific study of the problem ; in particular the movement of salts must be dealt with. Wherever you have, in London, heavy mouldings, you have rotting and decay going on underneath. If you were to turn the hose on to them every summer, they might be all right and the difficulty might in that way be got over. But leaving them as they are, accumulating soot, moisture, and being exposed to the weather, means that decay is going on. Goldsmiths' Hall, which is regularly washed, you will agree, is in very good condition. I had not noticed the places, which have been mentioned, where it had not been washed, and where decay is still going on. In the case of these big buildings of limestone, I should have thought that their enormous cost would have made it worth while for the proprietors to have the hose turned on to them at definite periods, so as to help to preserve the stone.



Bridges*

BY SIR E. OWEN WILLIAMS, K.B.E., B.Sc., M.Inst.C.E.



Berwick Bridge: Built when James I united the Two Kingdoms

OF the works of mankind few are of greater material necessity than the bridge. Its significance has compelled its veneration, even worship. Without it we should be segregated and classified into less than watersheds. With it we pass lightly and equally over brook and chasm. Towns and cities have sprung up around it, and for its possession some of the greatest battles of the world have been fought.

History, however, records that the bridge is a comparatively recent activity of mankind. Its story is the story of our present civilisation.

I believe no mention of the word will be found in the Bible. The art of the Greeks hardly extended to it, not unexpectedly when it is remembered that in their time buildings, of spans of comparative insignificance to us, remained unroofed out of sheer constructional inability. Their unit of construction was the beam or lintel of stone or timber, severely restricting the limits of the bridge, which can only make its greatest leaps in other forms and other materials.

The Romans, a race of engineers, developed the principle of the arch in bridges. They may be said to have stamped the arch as an almost synonymous term for a bridge, and to have founded a tradition in bridge construction, falsely interpreted to-day that only a bridge which is made to look like an arch can be pleasing. In this country the Romans built numerous small bridges, principally of timber, and after their occupation bridge and road construction was dormant for hundreds of years.

The frequent recurrence in place names of the suffix "ford," such as in Stratford, Wansford, etc., shows how recently this primitive means of crossing a river was in vogue in this country. Such bridges as were built were undertaken as hazardous and experimental enterprises, and when a bridge was persuaded, sometimes after many attempts, to remain, it became the mainstay of the community that gathered round it, and an object of wonderment to the country.

The balancing of the arch and the founding of its abutments were long practised before they were reduced to something approaching scientific exactness. A good example of the haphazard method of building was a bridge built at Pontypridd, in South Wales, by William Edwards, less than 200 years ago. It was first built as a three-span arch, but early after its completion was washed away by a flood. The builder then thought it would be easier as a single span of 140 feet, although this was a larger span than had been attempted anywhere since the days of the Romans. His shape of the arch was determined solely by the sweep of a pair of compasses, with the result, that in its turn it fell down. The builder could see as it fell that the crown was pushed upwards by the great weight over the haunches. In rebuilding it, he put great lightening holes to relieve this weight, and on the third occasion the bridge was successfully built. It remains to this day. It was a case where the first bridge failed by lack of knowledge of foundations, and the second bridge by lack of knowledge of the theory of balancing an arch, which is entirely a matter of its shape in relation to the load placed on it, but finally both errors were corrected by experience gained in their observation, and not by deduction from elements as is the scientific practice of to-day.

The great revival of bridge building, together with road construction, was witnessed at the beginning of the last century, principally engineered by Smeaton, Rennie, and Telford; but still the material was largely stone, and the type of construction the arch. Rennie may be said to be of the last of the stone bridge builders, and Telford of the first of those who built in metal, embodying principles other than the arch. The contrast might well be made as between Waterloo Bridge, the last of the great stone

* One of the series of Informal Illustrated Lectures for Workers in the Building Trades held by the R.I.B.A. Read on Wednesday, 15 February 1928.

bridges, and Menai Suspension Bridge, the first of the modern metal type. As between the two types there is an entirely different conception of the nature of the bridge. In one, mass and weight are emphasised, as though the object were to construct a solid rock through which holes were driven for the passage of the water. In the other, the bridge structure is conceived as a collection of forces clothed in metal, with every desire and every reason to make the structure as light as possible. In a word, it is strength as against mass. To reduce this to a comparison, the weight of Waterloo Bridge per square foot of roadway is about three times as much as that of the new 3,500-feet single span bridge being constructed over the Hudson River, New York, *i.e.*, a single span more than three times the total length of Waterloo Bridge.

PONT DU GARD : ARCHES ON ARCHES SECURING THEIR EFFECT BY REPETITION

THE ROMAN AQUEDUCT THAT OVERSHADOWS SEGOVIA

To Telford must be given the credit of grasping this fundamental change of thought, and of utilising it so aptly as he did in the Menai Suspension Bridge.

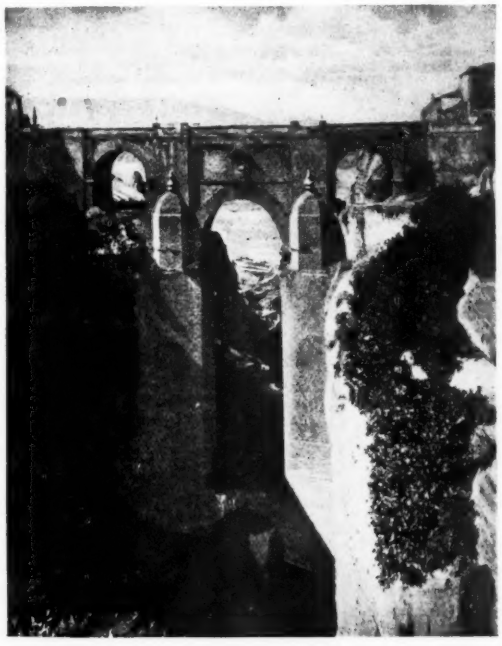
But the impulse which has compelled a still greater vision of the bridge has come from the introduction of mechanical transport both on rail and road. The steel that made mechanical transport possible was at hand as the medium for the vaster and stronger bridges that mechanical transport demanded. Railway bridges of great span were constructed, the outstanding one being the Forth Bridge with its span of 1,750 feet. But these were new bridges for new purposes on new routes, and meantime road bridges were falling into decay and disuse. Then appears mechanical road transport, compelling a reconstruction of the vast number of road bridges which exist in the world (averaging 1¼ to every mile of road), and adding to the problem by asking for new bridges on more difficult sites and of enormously longer spans. It is easy to understand the degree to which road bridges are chaotically outclassed, when it is recalled that 20 years ago they seldom carried more than a wagon weighing a ton or so, whilst now it is clear that we must anticipate and prepare for trains of loads each of 20 tons or more. It is as though a factory owner introduced into his factory

THE ROMAN BRIDGE AT SALAMANCA

THE BRIDGE AT LOZERE

CHESTER: GROSVENOR BRIDGE

new machinery, ten times the weight of the old, without first considering the effect on his floors. Gradually he would find, either by forethought or by hurtful experience, that the whole of his factory would require rebuilding, and so it is on a truly colossal scale with our bridges. We should not be surprised, therefore, that we must revive the interest which our forefathers had when bridges were few in number, because we have really, by our other actions, made bridges dwindle to few in number—still many to see, but few that are sound for our present purposes.



RONDA: PUENTE NUEVO

As we are entering an era of numerous reconstructions and construction of bridges, it would be wise to recast for ourselves fundamental conceptions of bridges. When bridges are being built and rebuilt for exactly the same loads, generation after generation, then tradition alone might be followed, but when we are pioneering, as we must be when fashioning the bridges of the future, it is wiser go build anew in every sense, accepting nothing and considering everything.

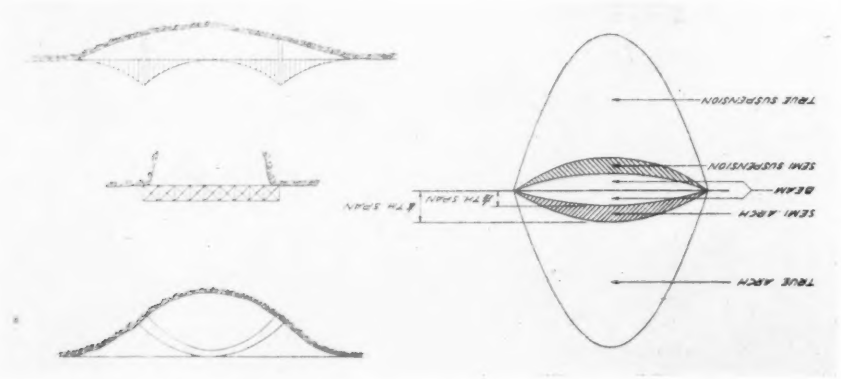
I am not going to attempt to discuss design, but I want to try to introduce into your minds a thought which may enable you to link up and make one of the many types into which bridges are divided. It is usual, and only natural, to think of a bridge as being that part of the structure that man has built, the part that is seen. It would be better in thinking of a bridge to include in the vision a section of the earth crust, regarding such piece of the earth as an intimate part of the bridge, because, as I will show you, it is the resistance and assistance that the earth gives which determines the type of a bridge. It is not the visible structure, but the manner in which the earth is acting, that fixes the type.

Bridges have become classified into three main types, the arch, the beam, and the suspension, with other subsidiary variations of these; but when each type is viewed with an appropriate section of the earth as a part of its system, they will all be found to have a common basis. When any piece of the earth (whether it be fashioned into a bridge by man, or whether it be an overhanging piece

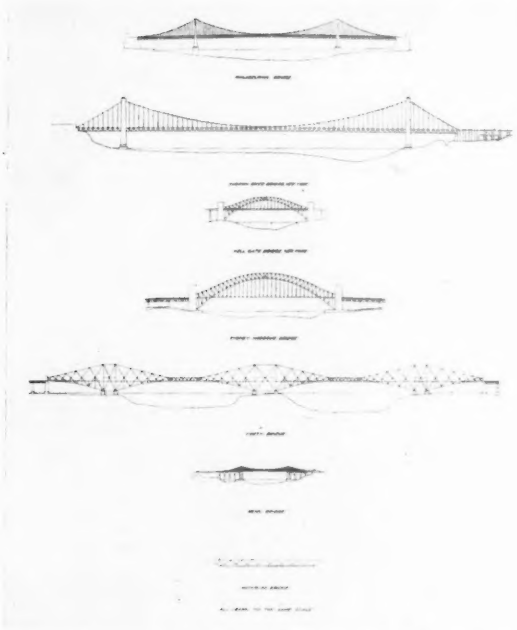
of rock or a natural arch) has a void between it and the surface of the earth, *i.e.*, when it spans an opening or projects beyond a vertical face, then two forces of nature

Every structure, whatever its type may be, has these characteristics.

In the arch that portion built by man is in compression,

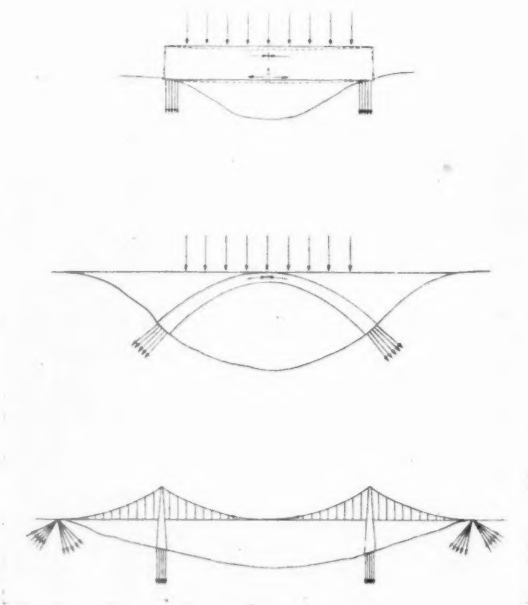


ALL TYPES OF BRIDGES BROUGHT INTO ONE DIAGRAM



VARIOUS BRIDGES OF THE WORLD DRAWN TO THE SAME SCALE

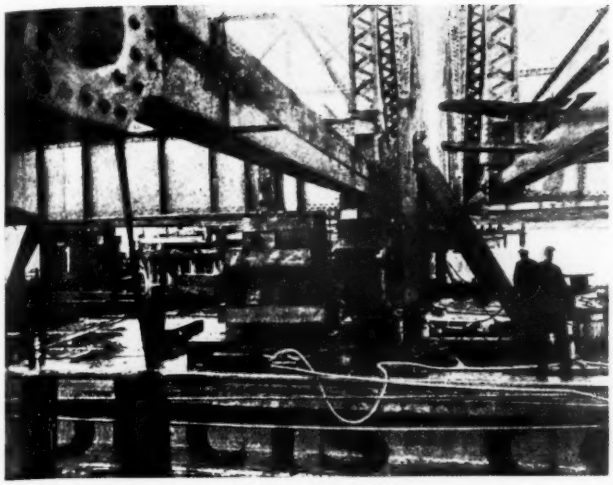
1 Philadelphia
2 Hudson River
3 Hell Gate
4 Sydney Harbour
5 Forth
6 Menai
7 Waterloo



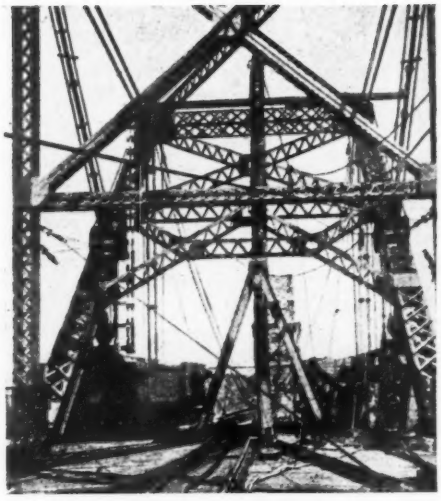
THE THREE TYPES OF BRIDGES

are brought into play—compression which tends to crush material, and tension which tends to tear material.

in the suspension bridge it is in tension, in the beam it is both in compression and tension, but in the arch the necessary complementary tension is found in the lateral or horizontal forces which are put on to it by the earth, and in the suspension bridge the necessary compression

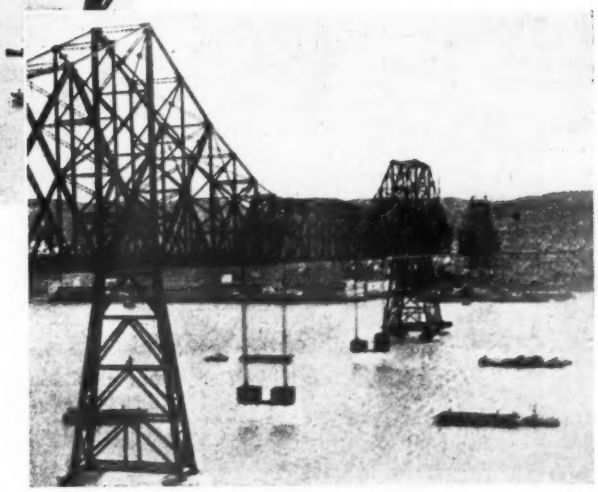


Four jacks each end to transfer span from falsework to scows
Timber brackets hold span against shifting



Counter-weights hanging at end of cantilever arm, ready to take weight of span
Gage board at left

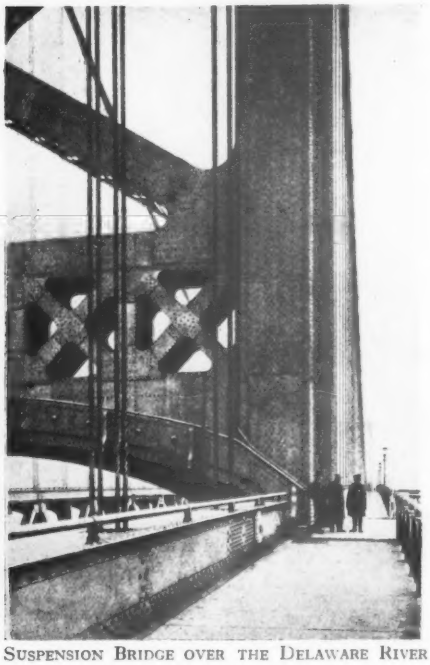
Span being hoisted. Note crossed emergency lines to hip points
Total hoisting time was 40 minutes



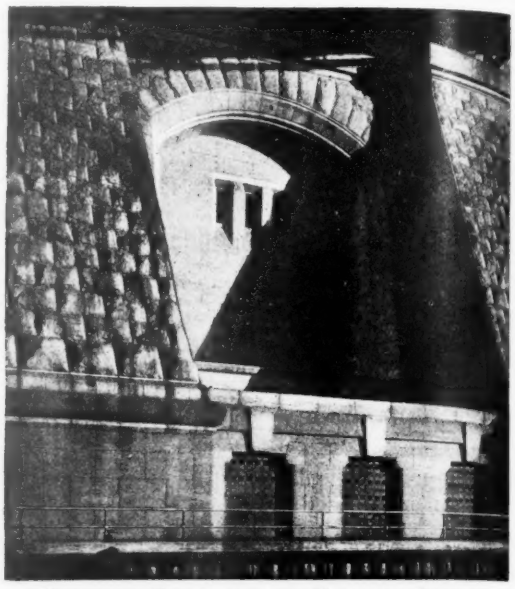
Suspended span in position and connected
Note transit man in tower at left

HOISTING ONE OF THE SUSPENDED SPANS OF CARQUINEZ STRAIT BRIDGE

SUSPENSION BRIDGE OVER THE DELAWARE RIVER



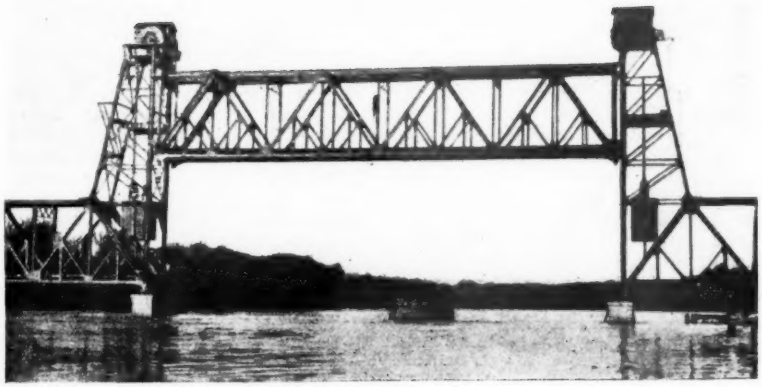
SUSPENSION BRIDGE OVER THE DELAWARE RIVER



SUSPENSION BRIDGE OVER THE DELAWARE RIVER AT PHILADELPHIA

is again found by the horizontal actions of the earth crust. Therefore the only difference between the three types is the extent to which it makes demands on the earth. The beam is self-contained and only requires vertical support, the arch and the suspension bridge not only require vertical support, but, in addition, horizontal support, *i.e.*, in a sense they have to be " riveted " to the earth to prevent sideways movement. The extent of the so-called " riveting " fixes the nature of the bridge. However much a structure may look like an arch, if it has not got the necessary riveting, so-called, then the earth will act on it exactly as it does on a beam, and whatever archlike appearance it may have, it is then in reality a beam. A curved appearance does not make an arch nor a suspension bridge. Their types are solely determined by the nature of their attachment to the earth. It is for this reason that in picturing a bridge I suggest you should also include a section of the surface of the earth.

It follows, in designing a bridge, the type should to some extent reflect the nature of the soil below, and for this reason types and forms of bridges are not a subject for fanciful imagination, but the result of the analysis of conditions, the principal one being the nature of the ground. Exploration by borings into the earth is therefore the first necessity before attempting the design of a bridge. In general, the nature of the soil is a factor which will eliminate or compel the adoption of certain types. The beam or any variation of it depends on vertical resistance of the earth alone, and can be designed so that considerable settlements have not the slightest effect on its security. The arch and the suspension bridge cannot permit of any settlement or movement of the ground.



WHITE RIVER LIFT BRIDGE: ROCK ISLAND LINES

In both cases movement of the ground will tend to make them into beam bridges, for which they were not proportioned, and danger or collapse would follow.

PERSPECTIVE DRAWING OF FORT WASHINGTON—FORT LEE SUSPENSION BRIDGE
Now under construction

I have attempted to summarise all types of bridges in one diagram (see page 300), showing the gradual change from one to another, the true arch gradually flattening and getting more and more tension into it until it becomes a true beam, and then, as the dip or downward deflection gets greater, becomes more and more a true suspension type. It is clear that the change from one to the other must be gradual, that a slight rise in a beam could not make it an arch, or a slight dip make it a suspension bridge, but although the change is gradual, the diagram can be divided into five zones, commencing with the true arch, with a rise or camber exceeding one-sixth of the span.

I define the true arch as being one in which the forces are entirely compressive and the whole of the tension taken up by forces in the ground, and it can be shown that this definition does not apply to arches flatter than one-sixth of the span. It is in this zone or region, *i.e.*, for arches above one-sixth of the span, that stone and other non-tensile materials find their place, and practically all the arches of the ancients are of this character.

Arch-shaped structures with a rise or camber exceeding one-twelfth of the span, but not exceeding one-sixth of the span, will be found to have, in spite of whatever attachment they have to the soil, serious tensile stresses, and may be classed as semi-arches. Stone, brick, and plain concrete are no longer useful, and we come into the region of tensile materials, such as reinforced concrete, steel, and other metals.

Structures which are flatter than one-twelfth of the span will be found to have very serious tensile stresses, and when exactly horizontal, tensile and compressive stresses are equal, the true beam is reached, *i.e.*, making no demand on the soil except for vertical support.

With increasing dip the ideal suspension type is met, in which all members remain constantly in tension.

Again I would emphasise that mere shape does not determine into which category the structure will come.

It will be shape, combined with the nature of its attachment to the soil and its demand on the soil, that determines the type. The diagram shows, assuming that the soil will do everything that is demanded of it, the shapes of the various types.

The use of various materials for construction is indicated by the diagram. Within the true arch zone, non-tensile materials, such as stone, may be used, but for the other zones, metal is an essential part of the bridge. The diagram also has some value when thinking in terms of decorative or architectural treatment of bridges. It is clear that no one would contemplate for one moment the encasement in stone of a pure suspension bridge to make it look like an inverted stone arch, and it is no less unreasonable, apart from impracticability, to encase in stone a beam or even a flat arch, which could only be built by the employment of tensile materials.

In the simplicity of its requirements a bridge differs from almost every other structure, except, possibly, a memorial. It has one single requirement imposed, and that is to carry traffic. It is therefore the more able to reflect conditions of the site, both in soil and surroundings, than a structure having complex functions, such as a factory or public building. The problem of designing a bridge is therefore one of saturation of the designer with site conditions, to discover that one suitable bridge, and one only, which, meeting all and every one of the conditions of the site, is the only solution and the only bridge for that site. The soil conditions, waterways, flooding, traffic, must be explored to a conclusion, and then, having collected every condition, the bridge will almost design itself. The only danger will be for the designer and all those connected with the construction of the bridge putting themselves and their own fads into it, instead of following the simple and only rule of being just to materials whether under, in, or over the foundations.

BRIDGE CONNECTING NEW JERSEY AND NEW YORK, KNOWN AS OUTERBRIDGE CROSSING

Reviews

TOWARDS A NEW ARCHITECTURE.*

To better understand what is at the bottom of M. Le Corbusier's venture after what Sir Edwin Lutyens lately so well described as "the Robotism of Architecture," may I be allowed to supplement very briefly Mr. A. S. G. Butler's able and concise review of this French book contributed to the current number of the R.I.B.A. JOURNAL? I suggest the study of René Fülöp-Miller's comprehensive volume recently published, entitled "The Mind and Face of Bolshevism."

Before I quote from his learned pages (and he writes with first-hand knowledge of his subject and as a patriotic Russian) I would like to make a passing reference to Le Corbusier's essay. "Towards a New Architecture." The photographs of the grain elevators show inspiring monsters fit company for the Druidical monoliths on Salisbury Plain. They do not, however, fly about like the aeroplanes, automobiles and Atlantic liners, in which the author, emotionally raptured, seeks affinity with such triumphs of architecture as the Parthenon. The diagrammatic sketches given of these classic ideals are very poor and some so badly drawn as to be of no value whatever.

The Robots and "mass-men" who are trying to develop architecture on such up-to-date methods tell us that stone as a building material is completely dead and out of harmony with the age, hindering the development of "The Mistress Art." Ferro-concrete also is out of date. Both are immobile in their dynamic possibilities and are "no longer able to keep pace with the tempo of our life, which is rapidly becoming dynamised." Men rush about in motors now, "to-morrow the pavements will begin to roll!"

Cubo-futurism calls upon architects and builders to adapt themselves henceforward to true proletarian art, and to give a notion as to that, Tatlin, we are told, has conceived a system of revolving rooms built between double walls in air-tight compartments on the principle of the thermos flask, so as to perfect central heating and economise further labour-saving devices. Or as a monumental exhibit witness the "Palace of Labour," contrived by Tatlin, the Bolshevik architect, commissioned by the Central Offices of Graphic Art, designed for Moscow consisting of three great glass chambers connected by a system of vertical axes and spirals keeping them in perpetual motion, but at different rates of speed and so ever on the go. The lowest chamber is cubiform, and turns on its axis once a year: it is to be used for legislative purposes, international conferences and other congresses. The chamber above this is pyramidal in shape and makes a revolution once a month; administrative and other executive bodies to hold their meetings there. Finally, the third and highest part of the building is in the shape of a cylinder, and turns on its axis once a day. This part of the building is chiefly devoted to propaganda and for an information bureau for newspapers, and also as the place whence brochures and manifestoes will be issued. Telegraphs, radio apparatus, and lanterns for cinematograph performances will be installed here, also sky signs and phosphorescent inscriptions as well as send-off platforms for aircraft. This Russian book is fully illustrated, and the examples of Iunii L. Annenkov's portraits are simply splendid excerpts of facial expressions realistically rendered, "warts and all," according to the injunction of Dr. Johnson.

MAURICE B. ADAMS [*F.*]

* See Mr. A. S. G. Butler's Review in the last issue of the JOURNAL, page 269.

"TERRA-COTTA" AND BRICK PAVEMENTS IN ITALIAN ART. *La Terracotta e Pavimenti in Laterizio nell'Arte Italiana. By Giulio Ferrari.* [*Milan: U. Hoepli.* 40].

This volume contains a large number of admirable illustrations of interesting examples of terra-cotta work in Italy, collected and arranged by Signor Giulio Ferrari, the Conservator to the Royal Museum of Art and Industry in Rome.

It has an interesting and well translated introduction by Signor Corrado Ricci, which gives a short history of terra-cotta, the use of moulds and stamps, the names of the numerous artists who modelled the clay or carved the baked moulds, all of which is well worth careful study.

Some fine examples of the works of Lucca della Robbia and of his nephew Andrea, are illustrated, also works of Guido Mazzoni, Nicola dell' Arca, and of many others too numerous to mention here.

Numerous reproductions are given of works by artists who have modelled portraits of priests, etc., and whose free and varied treatment of foliage, flowers, and figures would seem to show how much the modeller enjoyed doing the work. The frieze of the Church of St. Satirus, Milan; the façade of the Church of the Holy Ghost, Bologna; the Ospedale Maggiore, Milan; the Carthusian Monastery, Pavia, amongst many, are particularly worthy of note.

Examples of the combination of brick and terra-cotta, brick and pumice stone, are numerous. The treatment of the windows of the Asti Cathedral in brick and terra-cotta appear to me both charming and dignified against the lavish ornamental work of other buildings.

Well worthy of notice is the wonderful state of preservation generally of the material, shown clearly by the illustrations.

Signor Ferrari is to be congratulated upon the results of his labours, which have produced a most interesting volume upon a very pleasing subject, as is also the publisher, for the admirable reproductions of the photographs, drawings, and for the letterpress.

WALTER CAVE [*F.*]

SPECIFICATION 1928. *London: The Architectural Press. Fol.* 1928.

The 1928 edition of *Specification* well maintains the high standard of excellence which this important work of reference has established for itself during its three decades of existence; and it is because the book is so familiar to the architectural profession that in reviewing the current issue it is only necessary to call attention to the new features which have been introduced since 1927.

One naturally turns first of all to the series of illustrated special articles, which, each successive year, constitute such a valuable and distinctive adjunct to the volume.

The special articles are placed in the front portion of the book, and in the present edition there are six, occupying close on sixty pages. Taking them in their order the subjects treated are "The Planning of Flats," by Messrs. Percy B. and Grahame B. Tubbs [*F.*] and [*A.*]; "The Planning of Licensed Premises," by Mr. Melville Seth-Ward [*F.*]; "Floodlighting," by a Specialist; "Refrigeration and Cold Storage," by Mr. Hal Williams, M.Inst.M.E., M.I.E.E.; "Gas Coke as a Domestic and Central Heating Fuel," by a Fuel Specialist; and "Greyhound Racecourses," by Mr. C. W. Glover, A.M.Inst.C.E. This last is certainly opportune, and in view of the future it is all to the good that prominence should be given to the architectural aspects of greyhound racecourse design.

An innovation is introduced in the form of a frontispiece illustrating the new headquarters of the Society of Friends, for which building, it will be remembered, Mr. Hubert Lidbetter [*F.*] recently received the annually awarded R.I.B.A. London Street Architecture Medal. It is perhaps to be regretted that space could not have been found for the plans.

On the illustrations side we notice that two new full-page plates are included, showing in *facsimile* eighteen representative types of glass; while Mr. Walter R. Jaggard [*F.*] contributes three further drawings to his series of standard constructional details, the subjects selected being brickwork, steel roofs and plumbing.

RECENT FOREIGN PERIODICALS.

By Grahame B. Tubbs [*A.*].

The December number of *The Architectural Record* is an interesting one; it prints an account of Mr. Frank Lloyd Wright's Textile-Block Slab Construction which is a system of unit construction using square concrete slabs with a cavity between them and reinforced by vertical and horizontal steel rods with other rods tying the two walls together. It is called "Textile," because the outer face of the blocks is moulded, and the design formed is similar to textile design. Since 1923, Mr. Wright has perfected his system, and has built a number of characteristic houses, which are extremely original, but slightly reminiscent of the Maya work of Mexico.

The modern aquarium and its improvement on the old "tank," is the subject of an article by Mr. Chapman Grant, who has obviously given the subject much consideration, and his suggestions are valuable. Professor Hamlin writes a long and stimulating article on "Greek Architecture and the Critics," in which he traces the rise to popularity of Greek art and the fluctuation of appreciation through which it has passed since the publication of Stuart and Revett's *Antiquities of Athens* in 1762.

The efforts to humanise museums and make them take a vital place in the life of the community is described in another article, and is also the theme of a Special Number on Museums and Libraries, of *The Architectural Forum* for December, in which the many aspects of planning, equipping and organising Libraries, Museums and Art Galleries are considered experts. Examples of all kinds and sizes of buildings are given, including many of the first importance, such as the public libraries at Los Angeles, Pasadena, and Philadelphia; the art galleries at Boston and Brooklyn, and the Freer Gallery and National Gallery of Fine Art at Washington, as well as the Fogg Museum at Harvard, which is "the most complete and latest result of thorough-going co-operation between architect and museum authorities."

The amazing development of America since the War is brought home to one in an article on "The Place of the Hotel in the Modern City" in the November number of *The Pacific Coast Architect*. From a list that it publishes, one sees that in the State of California alone, there have been over 60 large hotels built in the last five years. Many of them cost over a million dollars, and one, the Biltmore, at Los Angeles, actually cost seven million dollars. The additional bedroom accommodation provided amounts to over 10,000 rooms.

In the December number of *The Journal of the Royal Canadian Institute of Architects* there is printed an article on the Church of the Visitation, Quebec, by Ramsay Traquair and E. R. Adair. It is based on extracts made from the Church records, and they show the nearly continuous growth of the Church and the additions to its decoration from the time when its foundations were dug, in 1751, to the building of the new façade in 1868. The records were, of course, kept in French.

Among the French magazines, *La Construction Moderne* for 1 January reviews the Salon d'Automne, and reproduces a "wild" studio by M. Nicolas, and the fine stained glass window by M. Gruber.

L'Architecture for 15 December also reviews the Salon, and the Moderns are well represented among the reproductions. The rest of the number is taken up with a large number of photographs of old France, from the Report of the Congrès Archéologique.

The Belgian *L'Emulation* for 27 December is devoted to modern Dutch work. One of the plates shows Herr Kramer's large store Bijenkorf, which has a fine breadth about it. The rest of the illustrations are of all sorts, some wild, some tame, and some half domesticated.

In the German *Wasmuths Monats hefte Für Baukunst* for January, Herr Paul Schmitthenner's country houses, which are of the eighteenth century types, with high roofs, are the feature. This very broad-minded paper wisely refuses to commit itself to the moderns or traditionalists, but gives all schools an equally good opportunity.

The December number of *Innen Dekoration* has, as usual, many charming examples, including several photographs of German interiors in colour.

Correspondence

THE PAVING OF THE PARTHENON.

28 *John Street*
Sunderland
3 *March* 1928

To the Editor, JOURNAL R.I.B.A.—

Being interested in Mr. E. J. Mager's subject, published in the R.I.B.A. JOURNAL, 25 February, I venture to put forward a tentative suggestion concerning this unsolved problem—the lighting of the Naos of the Parthenon.

Those who are familiar with the works of the late Sir J. Norman Lockyer, particularly "The Dawn of Astronomy," will remember his scientific theory relating to the astronomical orientation of temple planning in Egypt, and similarly to those buildings of a ritualistic usage erected in Greece.

In Egypt the structural details of a temple are familiar to us. As a general rule, from the entrance-pylon the temple stretches through various halls of different sizes, until at last, at the extreme end, what is called the Sanctuary, Naos, or Holy of Holies, is reached. This end chamber has only one opening, high up; the remaining portions of it are entirely closed.

Sir Norman found that most of the important temples still remaining in Egypt, such as that of Amen-Ra, for example, when tested by a theodolite, had their major axis oriented to a definite celestial body; the rising or setting of the sun; the rising or setting of a star.

These colossal structures, whilst outwardly they were regarded by the populace as places of sacred worship, to the priests were indeed astronomical observatories. The buildings themselves provided an extended axis open at one end and absolutely closed at the other. This form of construction, we are informed, aided the astronomers to detect the rising of the herald or heliacal stars, objects which heralded the rising or setting of a more important star, or even that of the sun when entering upon either its solstitial or its equinoxial phases

Sir Norman further explains that provided the temple was properly oriented, say to the solstice, at sunrise the beam of light would enter by the door of the temple and instantly flash into the darkened sanctuary, remain there for about two minutes, and then pass away. At a later period, we are told, a golden image of the titular god was placed within the darkened chamber, upon which the solar light would flash at the critical moment of either sunrise or sunset. All such manifestations of the god were received by the credulous populace, already assembled in the outer courts of the temple, with awe and reverence.

Incidentally, once a year, this same phenomenon happened within the Holy of Holies of King Solomon's Temple (equinoxial); save only in this instance the high priest, dressed in robes and wearing his twelve jewelled breast-plate, substituted the place of the Egyptian golden god.

Now, the fact of these darkened sanctuaries found at the rear of ancient temples is of importance, I consider, in the present instance.

It is now admitted that the early Greek colonists were filled with Egyptian learning, some of whom understood the esoteric ideas of the priesthood, and were therefore determined to erect temples in their native land. This was eventually accomplished by rearing those magnificent structures, modified to harmonise, however, with the changed climatical conditions and their particular form of ritual. Thus the roof of the temple was pitched in place of being flat, and the cell, instead of being at the rear, was brought forward to the front, in which was placed a statue of the titular deity.

It must be remembered, too, that the Greek temples were not placed haphazard upon their sites. As has been proved by Penrose, their major axis was usually oriented to one of the celestial bodies, in the same manner as those of Egypt. For instance, the axis of the Parthenon is oriented to the Pleiades, which constellation would be probably used as a herald star.

Coming to consider now the question of the Parthenon and its lighting problems, I venture to suggest, in view of the foregoing, that the Naos received no daylight other than that admitted by the principal doorway. In consequence, I am of the opinion there are two important objections to the theory that roof lighting of the interior should be essential. The first of these relates to the roof, which, when viewed externally, would thus exhibit roof-pockets upon either of its slopes, and consequently mar the regularity of the marble tile work. And, secondly, but most important of all, roof lighting would, it may readily be understood, defeat the facilities for astral observations, and also the esoteric purpose of the priests in performing their mystic rites exhibited to the populace, assembled without the temple walls.

Imagine the effect upon all onlookers who, one moment, gazing into blank darkness beyond the open door of the temple, instantly behold the flash of sunlight, in resplendent fashion, burst upon the glistening statue within; their feelings must have been stirred to the utmost!

Finally, there exists no method of draining surface water from either the floor of the temple nor the conjectural clerestories as suggested by Fergusson. Even the ingenious method shown by Mr. Mager, I consider, would not entirely obviate either of the disabilities to which reference is here made.

JOHN HALL [*F.*].

164 *Abbey Foregate*
Shrewsbury
2 *March* 1928

To the Editor, JOURNAL R.I.B.A.—

DEAR SIR,—Mr. Mager's suggestion of a surface paving on top of the present floor to the Parthenon raises one or two points for consideration.

He says "the paving would have to be fitted to the flutes of the columns," but with the suggested paving jointed according to his drawing, the slabs on either side of all the peristyle columns (with the exception of the four angle columns) would meet in a joint in the centre at the back and front of each column thus : ( )

Now, it at once becomes perfectly obvious that with *fluted* columns it would be impossible ever to lay these slabs in position on account of the undercutting resulting from the arrises to the flutes.

After the erection of the bottom drum of the column

shaft there seems to be no possibility whatever of placing the adjacent slabs in their places ; the arrises to the centre flute on the back and front of the column would most effectually prevent it, as would most of the other arrises excepting those near the centre on the flanks.

Then again, what would become of all the elaborate calculations based on the Module if it were proved that the real Module was a few inches higher up the tapering shaft !—Yours faithfully, EDWARD R. BILL [*A.*].

OLD TIMBER BUILDINGS

The Society for the Protection of Ancient Buildings,
20 Buckingham Street,
Adelphi, London, W.C.2.
24 February 1928.

To the Editor, JOURNAL R.I.B.A.,—

SIR,—I have here a letter sent me by a member of S.P.A.B., a fellow of the Institute. In it the writer asks if he may be helped to find a purchaser for the timber of a fine old barn.

I write to draw the attention of architects to this, and to ask them to help the Society in resisting the tendency so many of their clients have to buy such timbers ; for by such purchases England will in time be stripped of its fine barns and timber buildings—windmills, etc.—and get in exchange buildings which would have been better built in new oak.

Not only do I write for the protection of these old timber buildings, but also to add the warning : That with the old timbers the death watch beetle is often introduced into the house they are made to " decorate."—I am, your obedient servant,

A. R. POWYS, *Secretary.*

DAMPNESS AND RHEUMATISM.

Suite 227, *Western Mutual Life Building,*
321 West Third Street,
Los Angeles, California.
14 February 1928.

To the Editor, JOURNAL R.I.B.A.,—

SIR,—There is apparently some more general cause than dampness for rheumatic conditions. In California, food and personal habits of the patient are widely regarded as originating factors. Human mechanism will naturally land in the repair shop where food intake is excessive, too frequent, and of unsuitable mixtures. The localised cases quoted in the recent discussion* may possibly be connected with the tendency of cold, damp, and discomfort to induce excess eating and retard elimination. Favourable reports on the very poor and others may be due to simple living. Medical men must some day face the need for propaganda on rational eating. Good work is being done through the schools over here on this subject. Incidental to dampness and linoleum, experience here seems to prove the need for insulation from cold contacts. It is not a question of direct dampness, but that cold concrete, etc., causes heavy condensation under the linoleum, with mildew and buckling. Waterproofing alone is not sufficient, but the addition of a dry-felt insulating carpet gives a promising remedy. Wall contacts also need treatment. Condensation generally could well be given greater attention, both for interior and exterior construction. The use of granulated cork between coats of paint, to prevent condensation on the steel framing of ships, carries a suggestion for interior wall treatments of buildings. It is now customary in California work to treat brick and masonry walls with two spray coats of thin tacky asphalt, before plastering interior walls, preferably within 24 hours. Appreciating your JOURNAL reports of lectures and discussions.—Yours faithfully,

CHARLES CRESSEY [*F.*].

* See JOURNAL, 14 January 1928—" Medical Aspects of Damp in Dwellings."

THE £1,000 HOUSE.

" Homes and Gardens,"
20 Tavistock Street,
Covent Garden, London, W.C.2.

To the Editor, JOURNAL R.I.B.A.,—

DEAR SIR,—Many people of limited means to-day desire to build a house at a cost exceeding £1,000, excluding of land ; and houses of this kind are being erected in various parts of the country. Unfortunately, many of them are the work of speculative builders who have no proper knowledge of architectural design. I desire, therefore, to illustrate some architect-designed houses in order to show the general public what can be achieved, and I should be glad to see any photographs and plans of recent work which architects—especially the younger men—may care to forward for my consideration. —Yours faithfully,

R. RANDAL PHILLIPS,
Editor of " Homes and Gardens."

THE ARCHITECTURE CLUB.

Members of the Architecture Club will learn with very much regret that Mr. J. C. Squire has, owing to pressure of other work, found it necessary to resign the Presidentship. Mr. Squire was its first President and one of the original founders of the Club ; his enthusiasm in the cause of architecture has been a continual source of inspiration to its members, both lay and professional, and certainly he has been able to attract a wider attention in the lay press than is usual where architectural affairs are concerned. The arrangement of Architectural Exhibitions under his Presidentship has provided some of the best that have been held in London, and the discussions which have been held at the dinners of the Club have attracted lively and distinguished speakers. Although Mr. Squire has resigned the Presidentship, he will take over the Chairmanship of the Press Committee, and thus retain his active interest in the Club. Sir Lawrence Weaver will succeed him in the chair.

SIR BANISTER FLETCHER'S "HISTORY OF ARCHITECTURE."

Messrs. Batsford announce that Sir Banister Fletcher has just completed the revision of his well known *History of Architecture on the Comparative Method*, and the work will be published in an eighth edition during March.

The new edition reveals evidences of careful revision, and the restorations of classic cities which are among the new illustrations introduced should prove particularly welcome.

REPORT OF THE DELEGATES OF THE R.I.B.A. TO THE BRITISH WATERWORKS ASSOCIATION.

STANDING COMMITTEE ON WATER REGULATIONS.

Preliminary.

1. The late Incorporated Joint Committee on Water Regulations was first constituted in 1904, and was incorporated by licence from the Board of Trade dated 18 November 1908, in which year it issued Specifications of Standard Water Pipes and Fittings. The Specifications were revised in a second issue in 1912, and were supplemented in April 1913.

2. The Incorporated Joint Committee was wound up in voluntary liquidation in November 1919, and the first meeting of the Standing Committee, as constituted under the Articles of Association of the British Waterworks Association, was held on 6 January 1920.

3. The Standing Committee provides for representation of the British Waterworks Association, the Water Companies' Association, the Institution of Water Engineers, the Royal Institute of British Architects, the Worshipful Company of Plumbers, the National Federation of Plumbers, the Royal Sanitary Institute, and certain co-opted members. In effect, the Articles entrust the carrying out of the powers and functions of the late Incorporated Committee to the Standing Committee, whose constitution is similar to that of the old body and represents all interests concerned, including the manufacturers, through the three groups of Brass-Founders' Employers' Associations in the country.

4. *Model Bye-Laws and Specifications.*—An account was given in 1923 of the preparation and publication of the two revised Specifications of Standard Water Pipes and Fittings, dated February 1921, and December 1922.

5. The draft of 1922 was sent to the Ministry of Health on 16 December 1922, as a Draft Model Code. Objections were subsequently lodged against the draft, and as the result of two conferences at the Ministry, a Joint Advisory Committee on Water Fittings and Bye-Laws was formed, which held its first meeting on 26 October 1923, when Mr. E. A. Sandford-Fawcett, C.B., M.Inst.C.E., Chief Engineering Inspector of the Ministry, was in the chair.

6. This led to the preparation of a separate Model Specification of Water Pipes and Fittings, issued in 1924 and revised in 1926, and of Model Bye-Laws issued in 1926, as H.M. Stationery Office publications. These two documents are obtainable for 3d. each.

7. As these Model Bye-Laws and Specifications of the Ministry of Health differ in many respects from the B.W.A. revised Code of Bye-Laws and Specifications, the latter has, with some minor revision, been published as the definite four star edition of 1926, and is on sale for 5s. the copy.

8. *Ministry of Health Specifications. Adoption of a new Swan Stamp.*—Upon the issue of the Ministry of Health Specifications an application was made to the Board of Trade for the registration of a new Trade Mark to be used by Licensees of the Association upon fittings made to these specifications. A Certificate of Registration from the Patent Office, dated 9 February 1927, was duly received. Subsequently an application was made by a firm for this Trade Mark to be removed from the Register, and this litigation is still pending.

9. *Defective Fittings.*—The Standing Committee have had occasion during the year to take strong disciplinary action with certain manufacturers holding the Association's licence for placing fittings upon the market bearing the J.C.S.W.R. mark, but which fail to comply with the J.C.S.W.R. specifications. Explanations have been called for from the firms complained of, the Standing Committee being determined that manufacturers who honourably abide by the agreement entered into with the Association, and the conditions upon which the Certificate is held, shall not be handicapped in the manner indicated.

10. *Testing of Fittings.*—The Committee have had submitted to them for testing, during the year, a large number of fittings of various kinds, together with reports thereon from Mr. Stilgoe, M.Inst.C.E., the Chief Engineer of the Metropolitan Water Board.

This business stands referred to a Testing Sub-Committee which meets prior to ordinary meetings of the Committee for the purpose of inspecting fittings submitted for testing and examination in the Testing Shop of the Metropolitan Water Board.

11. We append a list of the manufacturers holding the J.C.S.W.R. stamp and those holding the Swan stamp.

H. D. SEARLES-WOOD.
P. HOPKINS.

BRITISH WATERWORKS ASSOCIATION
(Incorporated).

J.C.S.W.R. STAMP LICENSEES: TRADE MARK NO. 295,008 OF 1920.

List of Firms Licensed to Manufacture and Mark Standard Water Fittings and their Identification Numbers.

May, 1927.

1. Woodhouse & Co., Ltd., Hexthorpe Brass and Iron Works, Doncaster.
2. Henry Bisseker, Ltd., New Bartholomew Street, Birmingham.
3. Sheppard, Petigrew & Co., Scotia Works, Garrison Lane, Birmingham.
4. Edward Foster & Son, Ltd., Central Brass & Copper Works, Halifax.
5. Gummers, Ltd., Rotherham.
6. B. G. Smith, Stannary Works, Halifax.
7. Meynell & Sons, Montrose Street, Wolverhampton.
8. Guest & Chrimes, Foundry and General Brass Works, Rotherham.
9. Twyfords, Ltd., Cliff Vale Potteries, Hanley, Stafford.
10. (Cancelled.)
11. John S. Walford & Son, Ltd., 62 and 63, Hampton Street, Birmingham.
12. John Webb & Co., Ltd., Crescent Works, Hockley, Birmingham.
13. J. Blakeborough & Sons, Hydraulic Engineers and Founders, Woodhouse Works, Brighouse.
14. Evered & Co., Ltd., Surrey Works, Smethwick.
15. W. Heaton & Co., Ltd, Milmoor Brass Works, Rotherham.

16. Tylor (Water and Sanitary), Ltd., Engineers, Iron and Brass Founders, Belle Isle, York Road, London, N.
17. T. Holcroft & Sons, Ltd., Ettingshall Foundry, Wolverhampton.
18. Whitehouse Bros., Simplex Foundry, Wolverhampton.
19. Hayward-Tyler & Co., 99, Queen Victoria Street, E.C.
20. W. & J. Lawley, Britannia Foundry, Sams Lane, West Bromwich.
21. Shanks & Co., Ltd., Barrhead, Renfrewshire, Scotland.
22. Samuel Booth & Co., Ltd., Cheapside Works, Birmingham.
23. (Cancelled.)
24. Wheeler & Wheeler, Stewart Street Brass Works, Wolverhampton.
25. A. D. Foulkes, Ltd., Lionel Lead and Phœnix Brass Works, Birmingham.
26. John Russell & Co., Ltd., Belmont Brass Works, New Spring Street, Birmingham.
27. Sperryn & Co., Ltd., Moorsom Street Works, Birmingham.
28. James Barwell, Ltd., 40, Great Hampton Street, Birmingham.
29. (Cancelled.)

(The foregoing were issued by the I.J.C.W.R.)

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30. J. Breedon & Co., Ltd., New Mill Works, Fazeley Street, Birmingham.
31. Pegler Bros & Co. (Doncaster), Ltd., Belmont Works, Doncaster.
32. William E. Farrer, Ltd., Star Works, Heath Mill Lane, Birmingham.
33. Manley & Regulus, Ltd., Birch Street, Wolverhampton.
34. Bach & Co., General Brassfounders, Coleshill Street, Birmingham.
35. Llewellins & James, Ltd., Castle Green, Bristol.
36. C. H. Edwards, Ltd., Reliance Works, Millfields, Ettingshall, near Wolverhampton.
37. Aston Brass Co., Ltd., Wood Lane, Bromford, Erdington, Birmingham.
38. E. A. Cooke, Ltd., Reliance Works, Bath Row, Birmingham.
39. Davis & Brocklesby, Ltd., 147–151, Radnor Street, Hulme, Manchester.
40. Charles Winn & Co., Ltd., St. Thomas' Works, Granville Street, Birmingham.
41. W. & J. Forrester & Co., Larbert, Scotland.
42. Dodd & Oulton, Ltd., Stanley Street, Liverpool.
43. W. Firmin & Son, Ltd., 140–146, St. Stephen's Road, Old Ford, London, E.
44. Morrison, Ingram & Co., Ltd., Hygeia Works, Hadfield Street, Cornbrook, Manchester.
45. (Cancelled.)
46. (Cancelled.)
47. Doulton & Co., Ltd., Paisley Works, Hawkhead Road, Paisley.
48. Barber, Wilson & Co., Ltd., Boundary Road, Westbury Avenue, Wood Green, London, N.22.
49. W. P. Chesney, Willenhall, near Wolverhampton.
50. (Cancelled.)
51. Saunders & Connor (Barr Head), Ltd., Barr Head, Scotland.
52. James Chew & Co., Brook House, Copper Works, Blackburn.
53. Edward Barber & Co., Paxton Road, Tottenham, N.17.
54. Enstone & Co. (Successors), Ltd., Evelyn Road, Greet, Birmingham.
55. W. Emery & Co., 167, Arundel Street, Sheffield.
56. The Lead Wool Co., Ltd., Snodland, Kent.
57. Hattersley (Ormskirk), Ltd., Ormskirk, Lancs.
58. Martineau & Smith, 56–62, Holloway Head, Birmingham.
59. M. Cockburn & Co., Ltd., Ironfounders, Falkirk.
60. Henry Harper, Howard Works, Witton Road, Birmingham.
61. C. Waghorn, Ltd., Garfield Brass Works, Halifax.
62. Farringdon Works and H. Pontifex & Sons, Ltd., Tyseley, Birmingham.
63. The South Western Brass Foundry, Ltd., Mill Street, Plymouth.
64. Thomas Dudley, Ltd., Groveland Road, Tipton, Staffs.
65. The Sanbra Engineering Co., 122–125, Prichett Street, Birmingham.
66. Donald Brown, 345, Chester Road, Manchester.
67. Archibald Kenrick & Sons, Ltd., West Bromwich.
68. Hyde & Sons, Cable Street, Wolverhampton.
69. Ewart & Sons, Ltd., 346, Euston Road, London, N.W.1.

SWAN STAMP LICENSEES: TRADE MARK NO. 466,302 OF 1927.

List of Firms Licensed to Manufacture and Mark Standard Water Fittings and their Identification Numbers. May 1927.

1. Woodhouse & Co., Ltd., Hexthorpe Brass and Iron Works, Doncaster.
5. Gummers, Ltd., Rotherham.
7. Meynell & Sons, Montrose Street, Wolverhampton.
8. Guest & Chrimes, Foundry and General Brassworks, Rotherham.
18. Whitehouse Bros., Simplex Foundry, Wolverhampton.
22. Samuel Booth & Co., Ltd., Cheapside Works, Birmingham.
25. A. D. Foulkes, Ltd., Lionel Lead & Phœnix Brass Works, Birmingham.
27. Sperryn & Co., Ltd., Moorsom Street, Birmingham.
33. Manley & Regulus, Ltd., Birch Street, Wolverhampton.
36. C. H. Edwards, Ltd., Reliance Works, Millfields, Ettingshall, near Wolverhampton.
40. Charles Winn & Co., Ltd., St. Thomas' Works, Granville Street, Birmingham.
43. W. Firmin & Son, Ltd., 140–146, St. Stephen's Road, Old Ford, London, E.
48. Barber Wilson & Co., Ltd., Boundary Road, Westbury Avenue, Wood Green, London, N.22.
49. W. P. Chesney, Willenhall, near Wolverhampton.
54. T. C. Enstone, Evelyn Road, Greet, Birmingham.
68. Hyde & Sons, Cable Street, Wolverhampton.
70. Green & Sherratt, Ltd., 84, Hatton Garden, E.C.

THE DECAY AND PRESERVATION OF BUILDING MATERIALS.

In May 1927, a circular, of which a copy is printed below, was sent to every member of the R.I.B.A. and of the Allied Societies in Great Britain and Ireland.

The Science Standing Committee are now informed by the Building Research Station that only three or four replies have been received to the appeal made to architects to co-operate with the Research Department in their work on this important subject.

The Science Committee would urge members to avail themselves of the opportunities afforded by the Building Research Station, and would point out that this co-operation not only helps forward the work of research generally, but assists architects in the solution of their own particular problems.

(THE CIRCULAR).

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

BUILDING RESEARCH STATION.

NOTE ON THE COLLECTION OF INFORMATION ON THE DECAY AND PRESERVATION OF BUILDING MATERIALS.

The problem of the decay and preservation of building materials is one of considerable complexity since there are so many factors of decay which act on an almost infinite variety of materials. The factors causing decay are well known. They may, very briefly, be summarised as :—Faulty treatment and use of the material ; physical agents, for example, temperature changes, moisture changes, and the crystallisation of salts ; chemical agents, such as atmospheric impurities ; and living organisms, bacteria and lichens. But the relative effect of these factors is different for each material and varies not only in different districts but also in different parts of the same building, and often in different parts of the same block of material.

Progress in the investigation of the problem is hampered by the difficulty of collecting reliable information, and it is believed that many architects, builders and others who are in close touch with the practical side of the problem, and who have unique opportunities for collecting such information, would be willing to help. It is proposed, therefore, by the Building Research Station of the Department of Scientific and Industrial Research, to establish a scheme of co-operation between those engaged in the scientific study of the problem and those whose business brings them in contact with its practical application and who are sufficiently interested to assist by giving an account of their own experiences and or by reporting any interesting examples they may meet. The foundations of geology of England were laid by a similar scheme of co-operation between a number of individuals scattered over the country.

The following five lines of co-operation are suggested, and as it is desired to avoid a stereotyped plan, it is left to the individual to decide which line he will follow.

1. A form of questionnaire may be used to supply information. A copy of such a questionnaire will be forwarded on request. In order to cover the field of inquiry it is, of necessity, somewhat lengthy, and it is recognised that in many cases complete records do not exist so that it will frequently be impossible to give all the details asked. It is, however, very desirable that where the information is available, full details should be given.

2. The preparation of a summary of personal views and experience will be as much appreciated as the completed form of the questionnaire.

3. A personal interview with those engaged in the investigation may be arranged. This should preferably take place in the architect's own district so that points of interest may be examined and photographs taken. Or else the interview may take place in London or at the Building Research Station.

4. The architect may keep the Station informed of any interesting points that may from time to time come under his notice, and of any renovations which are about to be undertaken in his district. He may also find it possible to obtain facilities for an examination of such buildings by representatives of the Station so that photographs may be taken for purposes of record and information.

5. Architects undertaking restoration work may arrange for typical weathered specimens to be collected. These should be carefully packed to preserve the weathered surfaces intact, and sent together with records of their exact position in the building *and all available information* to the Building Research Station. The specimens should, if possible, be large enough to allow of the examination of the unweathered material at the back of the block.

It should be particularly noted that, in the present state of our knowledge, records of sound materials of long standing are as valuable as those of decayed materials, and that records of failures in the use of remedial measures are as valuable as records of successes.

It is not proposed, in general, to publish any information obtained in regard to particular buildings. The data collected may, however, serve as a basis to scientific work, results of which may be published. Information supplied in response to this Note will be treated as strictly confidential and will not be published without permission.

All inquiries should be addressed to the

DIRECTOR OF BUILDING RESEARCH,
Building Research Station,
Bucknall's Lane,
Garston, near Watford,
Herts.

THE PROPOSED NEW BRIDGE AT CHARING CROSS.

The committee of engineers appointed by the Government to consider the feasibility, from financial and other aspects of the proposed new bridge at Charing Cross is expected to present its report this month. It is now widely thought that the report will be adverse to the scheme, partly on the ground that, in the opinion of the engineers, the cost will be much heavier than Lord Lee's Commission had anticipated. At present preliminary work is in hand on at least three schemes recommended in the Commission's report. The Ministry of Transport has approved the plans for the new Richmond Bridge, where the proximity of the railway bridge presents special difficulties, while the plans for the bridge on the Chertsey Road will be under consideration in the immediate future. The Bill necessary to enable the Victoria Dock Road widening scheme to be proceeded with will be presented to Parliament in the autumn, but in the meantime the Port of London Authority has agreed to provide the land required for the accommodation of workers displaced by the demolition of existing houses. Until these new houses are provided it is impossible to proceed with the scheme in its entirety.—From *The Times*, 3 March 1928.

Obituary

HALSEY RICARDO [*F.*].

By the death of Halsey Ricardo the art of architecture and the Royal Institute have lost a loyal and devoted adherent, and his friends have to mourn the loss of a talented and singularly kindly and attractive personality. His personality, indeed, was the keynote of his attraction, and the kindliness of a modest and unassuming, but very decided, character, the charm of a singularly pleasant voice, and the quick bright lift of the unusually handsome head made one's contact with Ricardo a pleasure and a gain. Living, as I did, for nearly twenty years as his neighbour in Bedford Square, and being, like himself, a member and a Past Master of the Art Workers' Guild, the meetings and committees of that Society were naturally frequent, and led to many friendly walks to and from the Guild on the part of Ricardo and myself, as well as to many casual meetings in Bedford Square. I never met him without pleasure, and never knew him to give a harsh or bitter judgment of anybody whatsoever.

He was a man of wide culture and of very quick intelligence, an ardent musician, a keen and appreciative student of art in all forms, and withal a most kindly, generous-minded, humorous and genial man.

Devoted to architecture and its history, I think he was not much actuated by personal ambition as to its creation in substantial form, and he was fortunately sufficiently endowed to be practically independent of its professional practice. His architectural views were original and intensely individual. He created little, but that little always with refinement and intense personal care. He worked entirely in his own home in London or in the very pleasant house he had built for himself in Sussex ; never, I believe, employing an assistant, and having no secretary nor even an office boy.

Of his delightful friend and quondam partner in a not very successful financial adventure in ceramics, William de Morgan, whom I had the pleasure of knowing, and of whose subsequent literary successes in life Ricardo and I were alike keenly appreciative, he spoke with great affection.

His wide and generous tolerance and good nature, his quick intelligence and genial charm, his strong individuality and humorous enjoyment of life made him a delightful friend whose loss is a severe blow to all who were privileged to know him.

EDWARD WARREN [*F.*].

LEWIS SOLOMON [*F.*].

Mr. Lewis Solomon [*F.*], who died on 15 February 1928 as the result of being knocked down by a motor lorry in the street, was an active member of the Royal Institute of British Architects. He was elected Associate 1871, Fellow 1883. Awarded the R.I.B.A. Donaldson Silver Medal 1865–66. Member of Council 1904–05. Member of the Board of Examiners from 1887 to 1910 and Vice-Chairman of the Board from 1907–1910. Continued as Hon. Examiner 1914 to 1916, and 1919 to 1923. Member of the Board of Architectural Education from 1910 to 1921 and a Vice-Chairman of the Board from 1911 to 1916, and from 1919 to 1920. Member of the Science Standing Committee from 1895 to 1900, 1901 to 1910, being a Vice-Chairman and subsequently Chairman from 1903 to 1908. Member of the Practice Standing Committee 1901 to 1902.

Lewis Solomon lost his mother when very young, and was therefore sent to a boarding school (Nuemegen's) at Kew. Afterwards he was educated at University College School and then University College, London.

After gaining the R.I.B.A. Donaldson Silver Medal 1865–66 he travelled in Italy. He was articled to Sir Digby Wyatt and acted as Clerk of Works under Sir Digby Wyatt at the India Office new buildings in St. James's Park, and then as Clerk of Works at the Ottoman Bank buildings before starting in practice on his own account ; in those days a very general custom for young architects. He carried on a varied practice for about fifty years, during which time he carried out buildings, commercial, domestic, secular, factories, warehouses, etc., chiefly in London and the suburbs. He had a considerable surveying practice and was often retained in arbitrations, and as an expert witness in legal actions, etc. He was architect for the following buildings amongst others :

Domestic.—Private houses in Hampstead and Westgate-on-Sea. Flats in Cavendish Square.

Shops.—Tottenham Court Road, Ludgate Hill, Camberwell Green, Maison Lyons (Oxford Street).

Warehouses and Factories.—London Wall, London Wall Avenue, Bevis Marks, Jewin Street, Bartholomew Close, Golden Lane, Old Ford, Tottenham, Harringay.

Lewis Solomon was born in 1848, married in 1883, and had two sons and one daughter. One son was killed in the war in 1917, the other son carries on the practice.

Having worked with Lewis Solomon for over forty years on the R.I.B.A. Examinations and the various Standing Committees, I have a good opportunity of knowing his great ability.

He was a man of independence of character and his charming personality carried great weight in all discussions that took place.

H. D. SEARLES-WOOD [*F.*].

F. CARSTAIRS ROGERS [*L.*].

Mr. Rogers died recently at Kimberley, where he practised as an architect, was responsible, amongst other buildings, for the Kimberley City Hall, the Alexander McGregor Memorial Museum, the Wesleyan Methodist Church and the Memorial Cross to the Highland Brigade at Magersfontein. He was elected a Licentiate in 1925.

In connection with the four hundredth anniversary of the death of Albrecht Dürer, which occurs in April next, Messrs. B. T. Batsford, Ltd., of 94 High Holborn, are publishing in a limited edition of 100 copies a sumptuous portfolio of facsimiles of the artist's choicest drawings in colour, line, and wash, selected from the unique collection of originals preserved in the Albertina Museum at Vienna. The subjects, which are mostly in colour, have been chosen by Mr. Campbell Dodgson, M.A., C.B.E., the Keeper of Prints and Drawings, British Museum, who is one of the greatest living authorities on Dürer ; and he will also contribute an introduction and descriptive text.

The price of the portfolio will be £15.

Allied Societies

Notices

ESSEX SOCIETY OF ARCHITECTS.

COLCHESTER AND DISTRICT CHAPTER.

An exhibition of the R.I.B.A. Prize Drawings and Testimonies of Study will be held at the Albert Hall and Art Gallery, High Street, Colchester, from the 6 to 15 March inclusive.

NORTHERN ARCHITECTURAL ASSOCIATION.

A lecture on "Modern Hospitals" will be given by Mr. William Milburn, junr., F.R.I.B.A., on Tuesday evening, 27 March, 1928, at the Vane Arms Hotel, Stockton-on-Tees, at 7 p.m., illustrated by lantern slides.

Report of Meetings

BIRMINGHAM ARCHITECTURAL ASSOCIATION

ANNUAL DINNER: SPEECH BY MR. NEVILLE CHAMBERLAIN.

There was a large and representative attendance at the annual dinner of the Birmingham Architectural Association at the Queen's Hotel, on 24 February. Mr. Ernest C. Bewlay (president), presided, and was supported by the Lord Mayor (Alderman A. H. James), the Minister of Health (Mr. Neville Chamberlain), and the President of the Royal Institute of British Architects (Mr. Walter Tapper, A.R.A.).

Proposing the toast of "The Royal Institute of British Architects," Mr. Ernest C. Bewlay said the Institute had grown to be a powerful organisation. He thought there were some people who regretted to find, as they thought, one of the arts becoming professionalised; but architects had to live, and they thought they could live best by combining with other architects. He hoped that those Members of Parliament who were present would support the Bill for the registration of architects. If that Bill were passed, it would no doubt be for the benefit not only of architecture and architects, but the public as well. They were glad to have with them Mr. Neville Chamberlain, and they congratulated him upon the part he had taken in securing from Mr. and the Hon. Mrs. Anstruther Gough Calthorpe so splendid a gift of land for the Birmingham University. As citizens of Birmingham they were very grateful to Mr. Chamberlain for the part he had taken in that matter.

Replying, Mr. Walter Tapper said the Birmingham Association, founded about fifty years ago, was one of the most energetic and influential of the associations throughout the country. Birmingham fifty years ago gave a lead to the great cities of the country, and showed what an enthusiastic Corporation could do in the way of architecture. It had followed that up by establishing a Civic Society which had done good work in Birmingham and equally good work throughout the country. For much of the success of that society they could congratulate Mr. Haywood. In Birmingham there had recently been erected two notable buildings—the Masonic Hall and the Hall of Memory—but the city still lacked a cathedral, and that was a defect which Birmingham should remedy. He hoped the architects of the city would have still further opportunities of showing their power in the development of the civic centre. If the scheme went through it would give an excellent opportunity for fine architecture. As president of the Royal Institute of British Architects he took the opportunity of congratulating Mr. Chamberlain upon the keen interest he had taken in the great housing question, which he had managed with great success, and on the help he had given in preserving the amenities of rural England.

Proposing the toast of "The City," Mr. Neville Chamberlain said he had heard that toast proposed in many ways, but he had never heard a word about the beauty of its outward form. The curious thing was that until quite recent times that fact never ruffled their complacency. They could point to no street worthy of a great city and to no group of buildings worthy to be compared with those of Athens, Rome, Vienna or London. But it was beginning to dawn upon the public mind that a change was necessary. Whether they were better educated than their forefathers or whether they were revolting against ugliness did not matter, but it was certain they desired a greater restraint in the landscapes they made for themselves. It was certainly unfortunate that they were fifty years too late. As the Minister of Health responsible for the provision of housing accommodation he was gratified with the phenomenal rapidity with which houses had been springing up, but that gratification had been diminished by some of the developments that had degraded and vulgarised the beautiful English countryside. The desire for beauty was like the desire for economy—everybody would like to see restrictions imposed upon other people. The time was coming when they would realise that the man who erected a house of materials which were quite out of harmony with the surroundings or the man who erected a great hoarding blatantly advertising some face powder or patent food would be recognised as committing an offence just as much as the man who discharged from his factory a poisonous effluent or black smoke. Just as they proceeded against persons who committed such offences he would include offences against æsthetic considerations. Still they were better than they were years ago.

If those new suburbs had followed the patterns of thirty to forty years ago it made one's blood run cold to think what the city would be like. The new villages for workpeople were at least far better than they used to be, and they were better in Birmingham than in many places. They would not have been able to make those improvements but for town-planning. By means of that scheme they were able to exercise a certain measure of control. But he wanted to go a little further. To have control over the ground plan was something, but they would not be doing all they might until they also controlled the elevations. Who would exercise the control, and who would control the controllers? That required a good deal of deliberation and discussion. He doubted whether in this democratic country the public would be willing to entrust a control of that kind to any but a popularly elected body, and if they did a popularly elected body would not be experts, though they could take expert advice if there were experts willing to give it. In Birmingham the Civic Society gave expert advice upon architectural matters affecting the welfare of the city, and in various parts of the country people often expressed to him appreciation of what the Civic Society was doing.

Mr. Chamberlain proceeded to refer to the policy of the City Council in clearing land in the centre of the city, and in inviting plans to show what might be done in the construction of a civic centre. Those responsible for the civic life of Birmingham, he said, realised that if Birmingham was an ugly ducking to-day it might be a swan some day to excite the interest and admiration of beholders.

The Lord Mayor responded. He desired to acknowledge and to pay tribute to the Advisory Committee of the Civic Society for the service they had rendered the city. The City Council was always ready to accept the advice of those who were actuated by the dictates of the highest citizenship. Whilst the City Council were desirous of improving the city, they were always exercised by a desire to meet the wishes of the ratepayers in the matter of economy.

The toast of "The Birmingham Architectural Association" was proposed by Mr. Percy E. Thomas (chairman of the Allied Societies' Conference) and responded to by Mr. S. N. Cooke (vice-president, Birmingham Architectural Association).

THE ESSEX SOCIETY OF ARCHITECTS.

West Essex Chapter.

An inaugural dinner of the West Essex Chapter of the Essex Society of Architects took place on Shrove Tuesday, 21 February, at the City Livery Club, when a representative gathering of architects and their ladies assembled from all parts of the county.

A party was conducted over St. Paul's Cathedral to view the operations now in progress to secure the Dome. Messrs. W. G. Allen and E. J. Bolwell personally conducted the party, which was privileged to inspect the magnificent working drawings and details, and the scale models showing the present operations. A visit was also made to the north-west tower, where the original scale model, made by Sir Christopher Wren, but not carried out, was inspected.

Over fifty guests sat down to the dinner, which was presided over by Sir Charles Nicholson, following a reception at which Sir Charles and Miss Barbara Nicholson and Mr. and Mrs. J. J. Crowe received the guests.

After the Royal toast had been given, the toast to the Chapter was ably proposed by Mr. Ian MacAlister, the Secretary of the R.I.B.A. He spoke most convincingly upon the benefits to the general public, and to architects alike, in the very moderate Registration Bill now before the House of Commons.

The chairman, Mr. J. J. Crowe, made a humorous response, and deputed the announcement of forthcoming events to the hon. secretary, Mr. S. Phillips Dales. These plainly show that the Chapter is likely to make a mark upon the district by supplying an excellent list of lectures for the High Schools in the county, as well as Art Exhibitions for the public, and conferences between architects and craftsmen with a view to better building.

The toast to the County Society was proposed by Mr. C. M. Shiner, who spoke of the need for co-operation between all the architects in the county, and instanced the sad lack of appreciation in Sir Christopher Wren's time, by public and officials alike. Mr. Shiner recalled the grief of the architect at being compelled to discard his favourite schemes for rebuilding the Cathedral, and constantly to cheapen his work, ultimately surrounding it by a cast-iron instead of a wrought-iron railing. For all this he received the modest sum of £300 per annum, one quarter of which he returned as his personal donation to the Building Fund, and he was ultimately obliged to appeal to Parliament for a payment of arrears of his stipend, which had accumulated to as much as £1,500. It was quite evident that a society of architects was even more necessary in those days than now! The toast was responded to by the President of the Society, Sir Charles Nicholson, in a delightful speech, which was, as usual, full of information.

LEEDS AND WEST YORKSHIRE ARCHITECTURAL SOCIETY.

The members of the above society met on 29 February, under the presidency of Col. Albert E. Kirk, O.B.E. [*A.*], to discuss the question of competitions, as to whether they should be open or limited.

That competitions should be open and unrestricted, was the view taken up by Mr. Donald Brooke [*A.*], of the Leeds School of Architecture, who contended that this system gave the budding architect a chance not only to show his metal, but probably to win his spurs, and formed a "post-graduate" course to his curriculum. The comparison of his efforts with those of his more mature and experienced brethren, was in itself a valuable experience. There were striking instances of open competitions for important buildings having been won by young practitioners—as witness Liverpool Cathedral; and now even a young lady architect had been placed first for the Shakespeare Memorial Theatre. To have limited that competition to "theatre" architects, so notoriously wanting in artistic inspiration, would have been nothing short of a calamity.

Mr. F. Chippindale, on the contrary, argued that nowadays so many buildings were required for special and technical purposes that competitions for such buildings ought to be restricted to those who specialised in the particular class of work required; otherwise young architects were only wasting their time. The London County Hall, which was put up to open competition, could hardly be regarded as a masterpiece. Where a young man did happen to succeed in winning an important competition, the result generally was that he was compulsorily associated with an older and less enthusiastic man, in the execution of the work, and his share of the glory considerably curtailed. There were architects' offices which were run on the competition gamble; where all the competition tricks and dodges were known, against which the young and inexperienced man stood little chance. He (the speaker) preferred to think that great architecture did not depend on such questionable aids.

A discussion followed, in which, among others, Messrs. Victor Bain [*A.*], J. Addison [*A.*], W. Whitehead [*A.*], and G. L. Broadbent [*A.*], took part.

The president, in conclusion, remarked that perhaps the preliminary open and eliminating competition was the fairest way of dealing with the problem; the system of inviting sketch schemes involving the minimum of laborious drawing with the maximum of idea, and, from the sketches thus submitted, select a short list to engage in a final contest.

Upon the vote being put, a large majority decided in favour of open competitions.

THE INCORPORATION OF ARCHITECTS IN SCOTLAND.

The monthly meeting of the Council of the Incorporation of Architects in Scotland was held at 15 Rutland Square, Edinburgh, on 28 February 1928, Mr. G. P. K. Young, F.R.I.B.A., Perth, presiding. Arrangements for the Annual Conference to be held in Edinburgh on 1 and 2 June next were discussed. A handsomely framed photograph of the Glasgow Municipal Buildings Extension designed by Messrs. Watson, Salmond and Gray, architects, Glasgow, in respect of which said firm received the R.I.B.A. Quinquennial Architectural Medal in 1927, was gifted to the Incorporation. Messrs. G. P. K.

Young, F.R.I.B.A., Perth; J. K. Hunter, F.R.I.B.A., Ayr; F. C. Mears, F.R.I.B.A., Edinburgh; and J. B. Nicol, F.R.I.B.A., Aberdeen, were appointed as the 4 representatives of Allied Societies in Scotland to the R.I.B.A. Council, London, for session 1928–29. Mr. Peter Sinclair, 305 Wellesley Road, Methil, was elected as Fellow, and Messrs. W. W. Sibbald, 78 Charlotte Street, Edinburgh, W. G. Weir, 256 West George Street, Glasgow, and J. S. Houston, 165 St. Vincent Street, Glasgow, were elected as Associates, while Messrs. C. E. Thomson and R. S. Scott, both of 60 Castle Street, Edinburgh, were elected Student Members of the Incorporation.

THE SOUTH WALES INSTITUTE OF ARCHITECTS.

Western Branch.

At the Ninth Annual Meeting of the Western Branch of the South Wales Institute of Architects, held at the Hotel Metropole, Swansea, Mr. Charles S. Thomas, F.R.I.B.A., President of the South Wales Institute of Architects, presided in the absence, owing to illness, of the Branch Chairman, Mr. C. Russell Peacock.

Mr. J. Herbert Jones, F.R.I.B.A., Swansea, was elected to the office of Chairman for the ensuing year. The new Chairman is a partner in the firm of C. S. Thomas and Herbert Jones, and has been Honorary Secretary of the Branch since its inception nearly ten years ago.

The following officers were also elected :—

Honorary Secretary—Mr. G. R. H. Rogers, L.R.I.B.A.

Honorary Treasurer and Librarian—Mr. Oliver S. Portsmouth, A.R.I.B.A.

Honorary Auditor—Mr. Ernest E. Morgan, A.R.I.B.A.

Committee—Messrs. H. C. Portsmouth, F.R.I.B.A., Charles S. Thomas, F.R.I.B.A., C. Russell Peacock, F.R.I.B.A., Sidney R. Crocker, L.R.I.B.A., Edwin Smith, A.R.I.B.A. (Neath).

Corresponding Member—Captain D. F. Ingleton, L.R.I.B.A. (Haverfordwest).

Students' Representatives—Messrs. C. W. Geddes and B. W. Ellis, P.A.S.I.

The following officers were elected to serve on the Council of the South Wales Institute of Architects :—

Messrs. J. Herbert Jones, Oliver S. Portsmouth, G. R. H. Rogers, Sidney R. Crocker, C. Russell Peacock, Edwin Smith, D. F. Ingleton; and as Associates' Representative, C. W. Geddes.

The President of the South Wales Institute of Architects then presented prizes to the Students who were successful in the Annual Competition for Measured Drawings. The prize winners were Messrs. W. Gwyther Thomas, Haverfordwest; Elwyn J. Rees, Pontardawe; and D. Eric Stephens, Swansea.

The Western Branch of the South Wales Institute of Architects has increased its membership during the year and the membership now stands at 32 Fellows, 20 Associates, and 21 Students from all parts of West Wales.

THE SOUTH WALES INSTITUTE OF ARCHITECTS.

Central (Cardiff) Branch.

Dr. R. E. Stradling, M.C., D.Sc., A.M.Inst.C.E., Director of Building Research in the Department of Scientific and Industrial Research, addressed the South Wales Institute of Architects and the South Wales Branch of the Institute of Builders at Cardiff on Thursday, 16 February, on "Cement and Concrete." Mr. T. Alwyn Lloyd, F.R.I.B.A., presided, in the absence of Mr. J. Llewellin Smith, L.R.I.B.A.

Dr. Stradling, who illustrated his lecture with lantern slides, gave an extremely valuable and interesting statement on the scientific aspect of architectural and building work. He showed how interesting was the evolution of building methods, dealing in turn with those adopted by the early Briton, the Roman, the mediaeval builder, and the builder of the Renaissance period, and indicated that if the stately homes of England remained in the old style, the more modern structure, from the council houses to great commercial buildings, were being fashioned largely in the sturdy white grandeur and of the composite fabrics produced by modern scientific methods.

Dr. Stradling's lecture made it clear that science is inevitably playing an increasing part in the building industry, and must have convinced his audience of the need for a greater knowledge of scientific method on the part of all who are co-operating in building work, whether as architects, builders, or craftsmen.

Annual General Meeting.

The annual general meeting of the South Wales Institute of Architects, Central Branch, was held in the Institute Rooms on Wednesday, 29 February 1928.

The Hon. Treasurer's balance sheet and report were received and adopted. They showed that the Branch was in a particularly healthy condition.

The Hon. Secretary's report was also adopted. This showed that a very useful year's work had been carried out and particular attention was drawn to the fact that the Lectures Programme for the session had been very successful. Attention was also drawn to the great help which the Branch had received from the *Western Mail*, the *South Wales News*, and the architectural press, in the giving of publicity to their various activities.

The following officers and members of the Executive Committee were duly elected :—

Chairman : Mr. J. Llewellin Smith, A.R.I.B.A., Aberdare.
Hon. Treasurer : Mr. Harry Teather, F.R.I.B.A.
Hon. Secretary : Mr. W. S. Purchon, M.A., A.R.I.B.A.
Executive Committee : Mr. Percy Thomas, Vice-President of the R.I.B.A.; Mr. T. Alwyn Lloyd, F.R.I.B.A.; Mr. Ivor Jones, A.R.I.B.A.; Mr. H. N. Edwards; Mr. Frank Heaven, A.R.I.B.A.
Representatives of the Associates and Students : Miss O. E. Price; Mr. C. J. Bartlett.

The following were elected as members of the Council of the South Wales Institute of Architects :—

Mr. J. Llewellin Smith, L.R.I.B.A.; Mr. Percy Thomas (Vice-President of the R.I.B.A.); Mr. H. N. Edwards; Mr. F. H. Heaven, A.R.I.B.A.; Mr. W. S. Purchon, M.A., A.R.I.B.A.; Mr. J. Williamson, A.R.I.B.A.; Mr. T. E. Smith; Mr. J. B. Fletcher; Mr. J. L. Rees, L.R.I.B.A., A.R.San.Inst.; Mr. C. F. Jones; Mr. A. G. Lynham, A.R.I.B.A.; Mr. J. H. Davies.
Representatives of Associates and Students : Mr. C. H. Evans; Mr. A. G. Fletcher : Mr. W. D. Mitchell.

A discussion on the aims and objects of the Branch followed. In the course of this discussion attention was drawn to the importance of the holding of more frequent meetings and to the question of arranging visits to works in progress and buildings of architectural interest.

NOTES FROM THE MINUTES OF THE COUNCIL.

6 *February* 1928.

THE ROYAL GOLD MEDAL.

The Council, by a unanimous vote, resolved to nominate Mr. E. Guy Dawber, A.R.A., as a suitable recipient of the Royal Gold Medal for 1928.

THE ESSEX SOCIETY OF ARCHITECTS.

The application of the Essex Society of Architects for admission as an Allied Society of the R.I.B.A. was approved.

THE SOCIETY OF PORTUGUESE ARCHITECTS.

A notification was received from the Society of Portuguese Architects that the R.I.B.A. had been elected an honorary member of the Society.

A cordial message of thanks was sent to the Society for the honour they had conferred on the R.I.B.A.

DESIGNS FOR BRIDGES.

On the recommendation of the Town Planning and Housing Committee it was decided to write to the Ministry of Transport and suggest that the Minister should notify the responsible authorities that their designs for bridges should be submitted to the Royal Fine Art Commission before his approval of them is sought.

THE ROYAL SANITARY INSTITUTE CONGRESS 1928.

Mr. E. Stanley Hall [*F.*], and Mr. H. D. Searles-Wood [*F.*] were appointed as the R.I.B.A. delegates to attend the Thirty-ninth Congress and Exhibition of the Royal Sanitary Institute to be held at Plymouth from the 16 to 21 July 1928.

THE HENRY SAXON SNELL PRIZE.

The Council approved the recommendations of a Joint Committee of the Board of Architectural Education and the Architectural Association for the revision of the conditions governing the award of the Henry Saxon Snell Prize. The revised conditions will be published in the R.I.B.A. Prizes and Studentships pamphlet which will be issued shortly.

THE R.I.B.A. EXAMINATIONS OVERSEAS.

The Board of Architectural Education reported the following results :—

(*a*) *The Final and Special Examinations, New South Wales.—Final Examination.*—Examined, 2 ; passed, 1.

Special Examination.—Examined, 1 ; passed, 0.

(*b*) *The Special Examination, Canada.*—Examined, 1 ; passed, 1.

(*c*) *The Special Examination, Melbourne.*—Examined, 1 ; passed, 1.

(*d*) *The Intermediate Examination, South Africa.*—Examined, 1 ; passed, 0.

EXAMINERS.

The following were appointed R.I.B.A. Examiners for the year ending 31 December 1928 :—

Intermediate Examination.—History of Architecture : Mr. H. Chalton Bradshaw ; Mr. Arthur Stratton ; Professor L. B. Budden ; Mr. W. H. Ansell. Calculations of Simple Structures : Mr. Donald Cameron. Design : Mr. E. B. Maufe ; Mr. O. P. Milne ; Mr. Louis de Soissons. Constructional Design and the Properties and Uses of Building Materials : Mr. W. S. Purchon ; Mr. R. A. Duncan.

Final and Special Examinations.—Design : Mr. L. H. Bucknell ; Mr. E. B. Maufe ; Mr. O. P. Milne. Construction : Mr. Donald Cameron ; Mr. W. E. Vernon Crompton ; Professor A. C. Dickie ; Mr. P. M. Fraser. Hygiene : Mr. W. R. Davidge. Specifications and the Properties and Uses of Building Materials : Mr. A. R. Powys. Professional Practice : Major Harry Barnes ; Mr. A. G. R. Mackenzie. Town Planning : Mr. W. Harding Thompson.

Thesis Examiners.—Mr. Arthur Stratton ; Mr. S. D. Kitson ; Mr. W. S. Purchon ; Mr. Alan E. Munby ; Dr. Raymond Unwin ; Professor L. B. Budden ; Mr. Geoffrey Lucas ; Lt.-Col. H. P. L. Cart de Lafontaine.

The R.I.B.A. Statutory Examination.—Mr. W. E. Vernon Crompton ; Mr. W. R. Davidge ; Mr. A. A. Fillary ; Mr. Baxter Grieg ; Mr. A. H. Kersey ; Mr. Alan E. Munby ; Mr. J. E. Mundell ; Mr. W. G. Perkins ; Mr. H. D. Searles-Wood ; Mr. W. Henry White.

The Examination for the R.I.B.A. Diploma in Town Planning.—Professor Patrick Abercrombie ; Professor S. D. Adshead ; Mr. E. G. Allen ; Mr. Reginald Bruce ; Mr. Arthur Crow ; Mr. W. R. Davidge ; Mr. F. M. Elgood ; Mr. W. Carby Hall ; Mr. W. A. Harvey ; Mr. H. V. Lanchester ; Mr. T. Alwyn Lloyd ; Mr. W. Harding Thompson ; Professor Beresford Pite ; Dr. Raymond Unwin.

THE THESIS IN THE R.I.B.A. SPECIAL EXAMINATION.

On the recommendation of the Board it was decided that the thesis be abolished in the case of the Special Examination, and that candidates be required to submit in support of their applications, as evidence of their general architectural knowledge and capabilities, examples of their work, accompanied by a detailed report, or reports. The report, or reports, should deal with the reasons for the selection of the site, its treatment and a description of the building of which the report is the subject.

THE LONDON COUNTY COUNCIL (GENERAL POWERS) BILL : DISTRICT SURVEYORS' FEES.

It was decided to send a letter to the London County Council on the subject of the proposed amendment of the District Surveyors' Fees as embodied in the draft Bill of the Council.

ARCHITECTURAL COMPETITIONS : ASSESSORS' AWARDS.

On the recommendation of the Practice Standing Committee it was decided to re-print in the JOURNAL the notice on this subject which was printed in the JOURNAL of 6 March 1926.

MEMBERSHIP.

Twelve candidates were nominated for the Fellowship ; eight candidates were nominated for the Associateship ; two candidates were nominated for the Hon. Associateship and one for Hon. Corresponding Membership.

The following ex-members were reinstated :—As Associates : George Lister Thornton Sharp, Charles Joseph Thompson. As Licentiates : James Frederick Carruthers Bell, William Francis Harber.

APPLICATION FOR ELECTION AS LICENTIATE UNDER SECTION III (*f*) OF THE SUPPLEMENTAL CHARTER OF 1925.

Three applications were approved.

RESIGNATIONS.

The following resignations were accepted with regret :—Percy K. Kipps [*A.*], Laurence Muskett Yetts [*A.*] Harry Gordon [*L.*].

THE VICTORY SCHOLARSHIP MEDAL.

The Victory Scholarship was founded by the Society of Architects in 1920 as a memorial to those members of the Society who gave their lives in the war.

The medal, which is illustrated above, will be presented to each winner of the Scholarship.

The medal was designed by Mr. E. B. O'Rorke, of the School of Architecture, the Architectural Association, and executed by Mr. Cecil Thomas.

As milling in raised letters round the edge are the words "A Memorial to the Fallen of the Society of Architects 1914–1918."

The dies for the medal were generously presented to the R.I.B.A. by a former member of the Society of Architects.

EXHIBITION OF ARCHITECTS' WORKING DRAWINGS.

An exhibition of architects' working drawings will be held in the R.I.B.A. Galleries from 12 to 24 March 1928, inclusive.

The exhibition will be open daily between the hours of 10 a.m. and 8 p.m. (Saturdays 5 p.m.) and will include drawings lent by :—

Mr. J. L. Ball, F.R.I.B.A. Mr. James Miller, F.R.I.B.A. Mr. Robert Atkinson, F.R.I.B.A. Mr. Louis de Soissons, F.R.I.B.A.

The exhibition is intended primarily for students of architecture ; they will be able to examine the drawings that a practising architect hands to a contractor, and thus will be afforded an insight into the methods adopted in a modern architect's office.

A special student's evening will be held at the exhibition on Wesnesday, 14 March 1928, at 8.30 p.m. All students are cordially invited to attend. It is hoped that the architects—or their representatives—who have lent exhibits will be present in order to explain the drawings to the students. Refreshments will be provided, and no cards of admission are required.

THE TITE PRIZE AND THE VICTORY SCHOLARSHIP, 1928.

Preliminary Competitions.

Attention is called to the fact that the closing date for the receipt at the Royal Institute of British Architects, 9 Conduit Street, W.1, of forms of application for admission to the Preliminary Competitions for the Tite Prize and the Victory Scholarship (previously announced for 5 March) has been extended to *Monday*, 12 *March* 1928.

R.I.B.A. SPECIAL EXAMINATION QUALIFYING FOR CANDIDATURE AS ASSOCIATE.

The Council of the R.I.B.A. have decided that the thesis or written article shall be abolished in the case of the Special Examination, qualifying for candidature as Associate, which is open to architects in practice and assistants over 30 years of age whose applications are approved by the Board.

Candidates will now be required only to submit, in support of their applications, as evidence of their general architectural knowledge and capabilities, examples of their work accompanied by a detailed report, or reports. The report, or reports, will be required to deal with the reasons for the selection of the site, its treatment, and a description of the building of which the report is the subject.

LONDON COUNTY COUNCIL.

Exhibition of Views of London.

The collection of prints and water-colours relating to London in the possession of the London County Council amounts to 6,700 items, and has been acquired either by bequest, gift or purchase.

Among the places and buildings illustrated in the present exhibition may be mentioned :—

Cuper's Gardens, Lambeth Palace, The Old Vic., Lambeth Church, Astley's Amphitheatre, Vauxhall Gardens, and Lambeth High Street.

The general public are admitted to view certain portions of the Hall (entrance in Belvedere Road) during the undermentioned hours :—

Saturdays.—From 10.30 a.m. to 12 noon, and from 1.30 p.m. to 3.30 p.m.

Easter Monday, Whit Monday and August Bank Holiday.—From 10.30 a.m. to 12 noon, and from 1.30 p.m. to 4.30 p.m.

R.I.B.A. STATUTORY EXAMINATIONS.

The R.I.B.A. Statutory Examinations for the office of District Surveyor under the London Building Acts, or Building Surveyor under Local Authorities, will be held at the R.I.B.A. London, on 2, 3, and 4 May, and on 17, 18, and 19 October 1928.

The closing dates for receiving applications for admission to the Examinations, accompanied by the fee of £3 3s., are 11 April and 1 October, respectively.

Full particulars of the Examinations and application forms can be obtained from the Secretary R.I.B.A.

STUDENTS OF SCHOOLS OF ARCHITECTURE AND PRACTICAL EXPERIENCE.

Members of the R.I.B.A. are reminded that two registers are kept in the office of the R.I.B.A. :—

(1) A register of advanced Students of Recognised Schools ;

(2) A register of the names of architects willing to take such students.

The intention is in this way to assist advanced students up to the state of the completion of their qualifications for exemption from the Final Examination ; one of the qualifications for exemption from the Final Examination being twelve months' office experience during the fourth and fifth years of the School course. Six months spent on building work and/or in a builder's office approved by the School, and otherwise gaining a knowledge of the practical side of building, is recognised as equivalent to six months of the total twelve months required to be spent in an architect's office.

The Council hope that general use will be made of the registers, and that as many architects as possible will place their names upon the register, and will afford students wherever possible facilities for acting as assistants to clerks of works for buildings in progress.

PROPOSED TOUR TO THE UNITED STATES AND CANADA.

It has been suggested that the Royal Institute should arrange a short tour to the United States and Canada this year, and the Secretary would be glad to hear from any members interested in the proposal.

It will be appreciated that there are many advantages to be gained by members making such a trip as this, quite apart from the fact that it would constitute a most enjoyable holiday and to some members a new experience.

The party would travel by Cunard Line steamers and the suggested tour on the other side would include New York, Philadelphia, Washington, Chicago, Detroit, Toronto, Montreal. The duration of the trip would be approximately one month, and if the party travelled Cabin Class the cost of the trip, inclusive of hotel accommodation would be £90 to £95. If the party travelled Tourist Third Cabin—a new class of travel specially intended for students, etc.—the total cost would be approximately £70 to £75.

The suggested date of departure is some time in July.

Will all members interested kindly communicate with the Secretary without delay ?

THE STANDARD FORM OF CONTRACT.

Attention has been called to the following passage in one of the speeches made at the Special General Meeting held on 25 January 1928, to consider the new Standard Form of Contract, and it has been pointed out that the representatives of the Government Departments only attended the meetings in a watching capacity and had no power to bind their Departments —

> " The situation then brought the builders, the architects, the surveyors and representatives of Government Departments together, and they entered into a solemn and binding agreement to confer together upon a building contract, and, if they were unable to agree, to refer the matter to an independent arbitrator who was to have power to settle."

It is regretted that unintentionally the passage quoted conveyed the impression that the Government Departments were parties to the agreement. It was not intended to do this and the opportunity is gladly taken of correcting this impression.

R.I.B.A. ANNUAL DINNER, 1928.

Architects will be gratified to learn that His Royal Highness the Duke of York has graciously consented to be present at the Annual Dinner of the Royal Institute of British Architects which will take place on Wednesday, 23 May, in the Hall of Lincoln's Inn, which has been kindly lent for the purpose by the Benchers.

Full particulars and application forms will be sent to all members at an early date.

The Registration of Architects

THE NEW STANDING ORDERS OF THE HOUSE OF COMMONS.

The House of Commons experienced the effect of the new standing orders which it adopted at the end of last Session for the first time last Friday. The result was that many members now realise that the House can be counted out at any time after one o'clock on a Friday afternoon if there are not forty members in the Chamber. The irony of the position on Friday was that, though only thirty-two members could be mustered in the Chamber when the count was taken, there were at least as many others within the precincts of the Palace of Westminster who did not realise that their presence was urgently required. As a result there is little prospect of the Registration of Architects Bill making further progress this Session.—From the *Times*, 3 March 1928. [Further reference will be made to this in a later issue.]

Notices

SPECIAL AND BUSINESS GENERAL MEETINGS, 19 MARCH 1928.

A Special General Meeting will be held on Monday, 19 March 1928, at 8 p.m., for the following purposes :

To read the Minutes of the Special General Meeting held on Monday, 25 January 1928.

To elect the Royal Gold Medallist for the current year. The Chairman to move :

> That subject to His Majesty's gracious sanction, the Royal Gold Medal for the promotion of architecture be presented this year to Mr. Edward Guy Dawber, A.R.A., F.S.A., Past President R.I.B.A., in recognition of the merit of his work as an architect.

THE TENTH GENERAL MEETING.

The Tenth General Meeting (Business) of the session 1927–28 will be held on Monday, 19 March 1928 at the termination of the Special General Meeting, for the following purposes :—

To read the minutes of the General Meeting (Ordinary) held on Monday, 5 March 1928; formally to admit members attending for the first time since their election.

To proceed with the election of the candidates for membership whose names were published in the JOURNAL for 11 February 1928 (pp. 241–2).

INFORMAL DISCUSSION OF MATTERS OF PROFESSIONAL INTEREST.

At the conclusion of the above Business Meeting there will be an informal and private discussion of matters of current professional interest or concern. Members are invited to bring up for discussion, with or without notice, subjects of professional interest or difficulty.

THE ANNUAL CONFERENCE OF THE R.I.B.A. AND ALLIED SOCIETIES. BATH, 20 to 23 JUNE 1928.

All members and students of the R.I.B.A. and all members of the Architectural Association and of the Allied Societies are cordially invited to attend the Conference to be held in Bath 20 to 23 June 1928. Full particulars will be issued in due course.

Members who propose attending the Conference are reminded of the following travelling facilities that are available :—

From London to Bath a tourist ticket is issued, available for three months, and with facilities for breaking the journey at all important points, for 24s. 9d. (3rd class).

Mr. Alfred Myers, railway agent, of 343 Gray's Inn Road, London, W.C., will be pleased to advise members who propose travelling from London and other centres, and also to issue tickets and book seats on application to him.

R.I.B.A. AND A.A. JOINT VISITS.

A visit of members of the R.I.B.A. and A.A. has been arranged to the new Midland Bank Premises, Poultry, E.C. (Architects, Messrs. Gotch and Saunders, with Sir Edwin Lutyens, R.A.) to take place on Saturday, 17 March 1928. Members will meet at the main entrance at 2.30 p.m. Tickets for the visit may be obtained from the Secretary of the A.A., 34–36 Bedford Square, W.C.1.

ASSOCIATES AND THE FELLOWSHIP.

Associates who are eligible and desirous of transferring to the Fellowship class are reminded that if they wish to take advantage of the election to take place on 4 June 1928, they should send the necessary nomination forms to the Secretary R.I.B.A. not later than Saturday, 17 March 1928.

LICENTIATES AND THE FELLOWSHIP.

The attention of Licentiates is called to the provisions of Section IV, Clause 4 (*b*) and (*c* ii), of the Supplemental Charter of 1925. Licentiates who are eligible and desirous of transferring to the Fellowship can obtain full particulars on application to the Secretary R.I.B.A., stating the clause under which they propose to apply for nomination.

ARCHITECTS, ENGINEERS, AND SURVEYORS DEFENCE UNION, LIMITED.

It would seem that the circular "A" issued by the Defence Union containing information relating to its objects has conveyed to some members of the Institute the idea that the Union is an organisation formed outside of, and in some way in rivalry with, the R.I.B.A. Possibly this is due to the fact that the Union is a separate body and that its offices are at 28 Bedford Square and not at Conduit Street.

However this may be, the Council of the R.I.B.A. desires to remove any misapprehension and to state that the Architects, Engineers and Surveyors Defence Union, Limited, was formed under the auspices of and with the sanction and support of the R.I.B.A., and has permission to indicate this in its circulars.

The Council of the R.I.B.A. urges all eligible members of the Institute who have not yet joined the Union to do so without delay and as a matter of course, not only in their professional interests, but with the object of establishing firmly a Defence organisation founded by members of the Institute and carried on under the auspices of and with the hearty support and approval of the Council.

All communications relating to the Defence Union should be addressed to 28 Bedford Square, London, W.C.1, where accommodation has been placed at its disposal by the Council of the Institute.

Competitions

THE ROYAL MASONIC INSTITUTION FOR GIRLS : SENIOR SCHOOL AT RICKMANSWORTH PARK.

The General Committee of the Royal Masonic Institution for Girls invite Architects of British Nationality to submit designs for a new Senior School proposed to be built on a site of some 200 acres known as Rickmansworth Park, at Rickmansworth.

Assessor : Mr. Henry V. Ashley, F.R.I.B.A.
Premiums : £750, £500, £400, £300, £200.
Last day for sending in designs : 5 September 1928.
Last day for questions : 1 March 1928.
Total cost not to exceed £350,000.

Conditions of the above competition may be obtained from the Secretary, The Royal Masonic Institution for Girls, 31, Great Queen Street, W.C.2.

PROPOSED NEW SENIOR ELEMENTARY SCHOOL AT BIRKDALE.

The Education Committee of the County Borough of Southport invite architects practising in the United Kingdom to submit designs in competition for a new senior elementary school at Birkdale. Assessor : Professor S. D. Adshead, M.A. [*F.*]. Premiums, £100, £75 and £50. Last day for questions, 31 December 1927. Designs to be sent in not later than 31 March 1928. By applying to the Director of Education, Municipal Offices, Southport, and enclosing 10s. 6d., conditions of the competition may be obtained.

MUNICIPAL COLLEGE OF TECHNOLOGY, MANCHESTER.

The Corporation of the City of Manchester invite architects to submit designs in competition for an extension of the College of Technology proposed to be erected on a site adjoining the present College of Technology building in Sackville Street and Whitworth Street, Manchester.

Last day for questions, Saturday, 10 December 1927.

Assessors : Messrs. Alan E. Munby, M.A. [*F.*], Henry M. Fletcher, M.A. [*F.*], and Francis Jones [*F.*].

Premiums : £500, £400 and £300.

Designs to be sent in not later than 5 p.m. on Friday, 30 March 1928.

For conditions apply to the Town Clerk, Town Hall, Manchester, and deposit £1 1s.

Members' Column

MESSRS. KNAPP-FISHER, POWELL & RUSSELL.

Messrs. Knapp-Fisher, Powell & Russell have, by arrangement with the Executors, taken over the goodwill of the practice of the late Mr. G. H. Fellowes Prynne, F.R.I.B.A.

All correspondence, etc., relating to Mr. Prynne's practice is accordingly transferred to their address, 4A Lower Belgrave Street, S.W.1.

APPOINTMENTS VACANT.

A firm of architects in Singapore requires an assistant good at design and perspective, medically fit. Salary five hundred dollars per month. Three years' agreement, passage paid. Good prospects. —Application to be made in writing to Mr. Cyril A. Farey, 7 Bedford Square, London, W.C.1.

Assistant required by firm of Architects in Malaya. Salary £700 per annum, with annual increment of £25. Fours years' agreement, with first-class passage out and home. If agreement is renewed, six months' full pay leave will be granted with first-class return passage. Permanency with excellent prospects for a suitable man. Only thoroughly competent and fully qualified architectural assistants need apply. Age 25 to 35, single. Applicants must be quick at modern design, and be able to prepare perspective sketches. A sound knowledge of reinforced concrete and steel frame construction, with calculation, is essential, and applicants must have had experience and be able to take charge of large and important buildings.—Apply Box 1618, c o The Secretary R.I.B.A., 9 Conduit Street, London, W.1.

OFFICE ACCOMMODATION.

F.R.I.B.A. has available office accommodation at a moderate rent on the first and second floors at No. 9 Newcomen Street, London Bridge, S.E.1. Part use of staff could be arranged.—Apply Box No. 2328, c o The Secretary R.I.B.A., 9 Conduit Street, London, W.1.

R.I.B.A., with an office in the West End, desires to meet another Architect with a view to sharing accommodation and running expenses.—Apply Box No. 2118, c o The Secretary R.I.B.A., 9 Conduit Street, W.1.

Fellow of the Institute with a West End office, having a room to spare, desires to meet another architect with a view to sharing accommodation and running expenses.—Apply Box 7474, c o The Secretary R.I.B.A., 9 Conduit Street, W.1.

FOR SALE.

A choice set of the *Architectural Association Sketch Book*, Series I, published 1867-1880 and Series II, 1880-1895—twenty-four folio volumes complete and in first-rate condition unsoiled and very rare. The first set is bound in green, the second in red. Half Morocco by Birdsall with leather labels on front. Also several volumes bound in cloth of the third series, all out of print.—Apply Box No. 8770, c o The Secretary R.I.B.A., 9 Conduit Street, London, W.1.

Minutes XII

Session 1927–1928.

At the Ninth General Meeting (Ordinary) of the Session, 1927–1928, held on Monday, 5 March 1928, at 8 p.m., Mr. Walter Tapper, A.R.A., President, in the chair.

The attendance book was signed by 19 Fellows (including 10 Members of Council), 22 Associates (including 1 Member of Council), 2 Licentiates, 1 Retired Fellow, and several visitors.

The Minutes of the Ordinary General Meeting held on 20 February 1928, having been published in the Journal, were taken as read, confirmed, and signed as correct.

The Hon. Secretary announced the decease of :

Edward Gabriel, elected Associate 1882.

Albert Edward Cuddy, elected Licentiate 1911.

And it was *Resolved* that the regrets of the Institute for their loss be entered on the Minutes and that a message of sympathy and condolence be conveyed to their relatives.

The following members, attending for the first time since election, were formally admitted by the President :—

Mr. G. H. Jack [*F.*]
Mr. R. A. Fitton [*A.*]
Mr. B. W. Stuttle [*A.*]

The Chairman announced that by a resolution of the Council the following had ceased to be members of the Royal Institute.

Associates.

Harry George Leslie.
Samuel Woods Hill.
Michael Calvert Sunter.

Licentiates.

Thomas John Evans.
John Harding.
Joseph William Nelson Ledbury.
Spencer Lewis Palmer.
Richard T. Perry.
Peter Reid.

Mr. G. H. Jack, M.Inst.C.E., F.S.A. [*F.*] having read a Paper on "Ancient Bridges," a discussion ensued, and on the motion of Mr. Henry M. Fletcher [*F.*], seconded by Sir Henry Maybury, K.C.M.G., C.B., Director General of Roads, a vote of thanks was passed to Mr. G. H. Jack by acclamation and was briefly responded to.

The proceedings closed at 10 p.m.

The Architects' Benevolent Society

HOUSE PURCHASE SCHEME.

It is the ambition of many men to acquire a house for themselves, and the Architects' Benevolent Society's Scheme of House Purchase makes it possible to obtain the necessary capital on equitable terms without using up existing securities or business capital, purchase being made out of income. The arrangement is carried out by means of a loan of not more than 75 per cent. of the certified value secured upon the house with an endowment policy to provide for its repayment. Its chief advantages are as follows :—

(1) Provision for dependents. In the event of your death, the loan is automatically discharged and the house released to your dependents free of debt.

(2) Special concession. In the case of houses in course of erection 50 per cent. of the loan will be advanced when the roof is on and the house covered in, subject to the approval of the mortgagees.

N.B.—This scheme is now extended to those outside the architectural profession, provided that the house has been designed and the applicant introduced by a member of the Institute.

Please address all enquiries to the Secretary A.B.S., 9 Conduit Street, London, W.1.

R.I.B.A. JOURNAL.

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